United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Montana Agricultural Experiment Station

# Soil Survey of Deer Lodge County Area, Montana

The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

# How to Use This Soil Survey

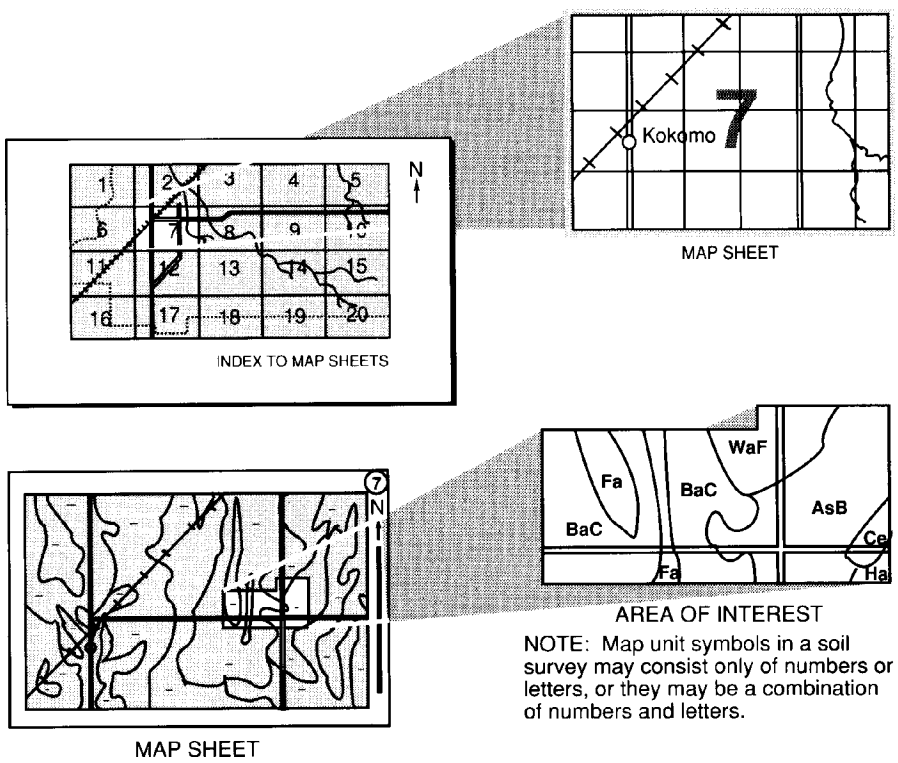
**Detailed Soil Maps**

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

To find information about your area of interest, you can locate that area on the **Index to Map Sheets**. Go to the Web Soil Survey for more information (http://websoilsurvey.nrcs.usda.gov/app/)

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.

See the **Contents** for sections of this publication that may address your specific needs.



## National Cooperative Soil Survey

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 has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Deer Lodge Conservation District.

Major fieldwork for this soil survey was completed in 1996. Soil names and descriptions were approved in 2001. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. The most current official data are available at http://websoilsurvey.nrcs.usda.gov/app/.

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.

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**Cover:** In the foreground, the soils are Beaverell cobbly loam. Shawmut extremely bouldery loam is on the terminal moraine. The Deer Lodge Mountains and Mount Powell are in the background.

*Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.*

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# 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 limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, 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 on 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. 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 local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Dave White
State Conservationist
Natural Resources Conservation Service

# Soil Survey of
# Deer Lodge County Area, Montana

Fieldwork by Brian D. Dougherty, Frank Gariglio III, Arnie Irwin, Thomas J. Keck, Huey A. Long, George A. Rolfes, and Neal Svendsen, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Montana Agricultural Experiment Station

DEER LODGE COUNTY AREA is located in southwestern Montana (fig. 1). The survey area includes 309,600 acres, or about 484 square miles. Deer Lodge County is bordered by Powell County to the north, Granite County to the west, Silver Bow County to the east, and Beaverhead County to the south. Anaconda, the county seat, is located in the north-central part of the county.

Over half of the county is included in the mapping area. Areas within Deer Lodge County that were not mapped include the portion of the Beaverhead-Deerlodge National Forest in the Anaconda Range, southwest of the Continental Divide; the southernmost part of the Flint Creek Range near Olson Mountain; and the easternmost extension of the county that includes Saratoga, Orofino, and Cottonwood Mountains. Lost Creek State Park is included in the mapping area.

In the mapping area, elevations range from 4,680 feet (1,426 m) above sea level at Racetrack, where the Clark Fork River flows out of Deer Lodge County, to a high of 10,607 feet (3,233 m) at Mount Haggin in the Anaconda Range. The high peaks of the Continental Divide have elevations between 9,500 and 10,650 feet (2,896 and 3,246 m). The elevation at Anaconda is approximately 5,200 feet (1,585 m) above sea level.

The survey area's residents are dependent on the area's natural resources for most of their livelihood. Ranching and farming, timber harvesting, and mining rely on the wealth of the geology, soil, and water of the region.

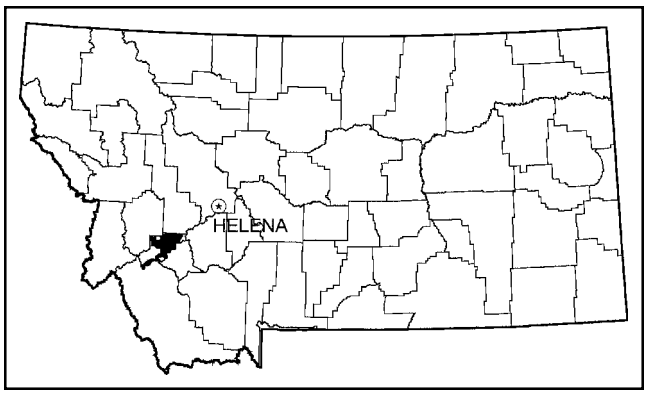


**Figure 1.—Location of Deer Lodge County Area, Montana**

# General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history and development; physiography, drainage, and geology; mineral resources; ground-water resources; geothermal resources, seismic activity; and climate.

## History and Development

Michael Garverich, Montana Geotechnical Engineer (Civil), Natural Resources Conservation Service, prepared this section.

The area covered by this soil survey gets its name from a mound of travertine and iron oxides deposited by the waters of a warm spring. This spring is located in the NW ¼, NE ¼, Section 24, T. 5 N., R. 10 W., on the west side of the Montana State Hospital, Warm Springs Campus. The Native Americans knew of the surrounding area as a winter range for deer. The mound of spring deposits resembled a large lodge as used for winter shelter; hence, it became known as “The Deer Lodge” (fig. 2). Subsequently, the name was given to the local valley, county, and the county seat of Powell County, the adjoining county to the north.

The Deer Lodge County Area lies in the upper reaches of the Clark Fork River Valley, also known as the Deer Lodge Valley; the northern part of the Big Hole Valley; and the adjoining mountain ranges. Its location places it along the Continental Divide, where a segment oriented in an east-west direction interrupts the divide’s general north-south alignment. Near the eastern end of the east-west segment is a low, open pass. This pass is so low and inconspicuous that it does not have a name but acts as a funnel for travel through the Deer Lodge area.

Initially, Deer Lodge County was established as a county within the area included in Idaho Territory in 1863. The county originally extended from its current southern boundary northward to the international boundary with Canada. When Montana Territory was established in 1864, Deer Lodge County was continued in the new territory, but much of its original area was transferred to several other counties as they were formed.

**Figure 2.—“The Deer Lodge” from which Deer Lodge County takes its name**

Native Americans first used the area of Deer Lodge County as one of the travel routes between the mountain valleys located west and north and the valleys and plains located east and south. The early trappers, followed by prospectors, and then ranchers and those with transportation interests continued to use this travel route. In the early 1860s, it was recognized that the area provided good year-round pasture for livestock. Ranching, along with a little farming, soon became the dominant use of the area.

In 1883, Marcus Daly of the Anaconda Company chose a site on Warm Spring Creek as the location to build a smelting facility for the rich copper ores of the Butte area, located about 25 miles to the east. This site, now the town of Anaconda, quickly became a major industrial location and continued to be so until 1980, when the last smelter closed. For almost 100 years, Deer Lodge County was the site of a succession of ever larger copper smelters, beginning with the 500-tons-per-day Upper Old Works Smelter, built in 1884, and ending with the closure of the Washoe Reduction Works, which produced 160,328,000 pounds of copper in 1979, the year before its closure in 1980. For much of this time, it was the largest nonferrous smelter in the world.

In 1977, the Anaconda Company merged with ARCO, a major oil company. Managerial decisions relating to this merger led to the closure of the smelter in 1980. The resulting loss of jobs and economic impacts continue to plague the area. In addition, a large area near the smelter had been contaminated by metals and sulfur released in the smelting process. After the closure of the smelter, the area was declared a “Superfund Site” in 1983 because of its contaminated soils. The ongoing reclamation of the area has had a large economic impact that will continue for some time.

The smelters and their smokestacks overshadowed nearly all facets of life in Deer Lodge County from their inception until their closure; their effects still linger because of the environmental degradation that they caused. Today, all that remains of these great smelters are the smokestacks, a few foundations and broken-down flues, great heaps of slag and tailings, and the largest “Superfund Site” in the United States.

As of 2005, farming, tourism, reclamation, and minor manufacturing provide the economic foundations of the area.

## Physiography, Drainage, and Geology

Marie V. Marshall, Montana State Geologist, Natural Resources Conservation Service, prepared this section.

### Physiography

The Deer Lodge County soil survey area lies in the Northern Rocky Mountain physiographic province, within the structural province of the Rocky Mountain Fold-Thrust Belt. The Continental Divide forms the southwestern portion of the county border, then trends eastward through the center of the county.

The county is characterized by rugged, mountainous terrain separated by the broad valleys of the Clark Fork and Big Hole Rivers. Portions of three mountain ranges extend into the county. The Flint Creek Range is high and rugged and extends into the northwestern part of the county. The high peaks of the Anaconda Range form the Continental Divide, and the range extends into the central and southwestern parts of the county. Warm Springs Creek separates these two ranges. The relatively low, rounded mountains on the eastern margin of the county are known locally as the Deer Lodge Mountains.

The Deer Lodge Valley is characterized by large, gravel-capped terraces that slope gently away from the high mountains toward the Clark Fork River. Near the river, there

are low terraces that were formed more recently. In the southern part of the valley, the terraces grade into coalescing alluvial fans that radiate outward from the mouths of some of the tributary canyons. The Big Hole Valley is crescent-shaped, with broad bottomlands and extensive grass-covered terraces. A northeast-trending fault bounds the valley to the west and rugged mountains surround it.

### Drainage

North of the Continental Divide, the Clark Fork River system drains Deer Lodge County. South of the divide, the Big Hole River and its tributaries drain the county. The headwaters of the Clark Fork River are located in the northeastern corner of the county, at the confluence of Warm Springs and Silver Bow Creeks near Anaconda. The headwaters of Silver Bow Creek are approximately one-quarter mile south of the Berkeley Pit in Butte. Major Clark Fork tributaries that drain the Anaconda Range north of the Continental Divide are Storm Lake, Twin Lakes, Barker, and Mill Creeks. Major Clark Fork tributaries that drain the Flint Creek Range include Flint, Warm Springs, Lost, and Modesty Creeks.

The Big Hole River drains the Anaconda Range south of the Continental Divide. Its major tributaries are Mudd, Fishtrap, La Marche, Seymour, French, Calvert, and Pintler Creeks.

Originally constructed by the Anaconda Company to provide water to its smelting facilities, Silver Lake, in the northwestern corner of the county, provides off-stream storage for water from Storm Lake Creek and Twin Lakes Creek. A dam on Flint Creek impounds Georgetown Lake. This facility was originally built to provide electricity for the Granite-Bimetallic Mine near Philipsburg but is now a regional recreational area.

### Geologic History and Regional Geology

**Geologic Time Scale**

| Age | Eon | Era | Period | Epoch | Years before Present<br>million years ago (mya) |
|---|---|---|---|---|---|
| | | Cenozoic | Quaternary | Holocene | 11,500 years to present |
| | | | | Pleistocene | 1.8 mya to 11,500 years |
| | | | Tertiary | Pliocene | 5.3 to 1.8 mya |
| | | | | Miocene | 23 to 5.3 mya |
| | | | | Oligocene | 33.9 to 23 mya |
| | | | | Eocene | 55.8 to 33.9 mya |
| | | | | Paleocene | 65 to 55.8 mya |
| | | Mesozoic | Cretaceous | | 145.5 to 65 mya |
| | | | Jurassic | | 200 to 145.5 mya |
| | | | Triassic | | 251 to 200 mya |
| | | Paleozoic | Permian | | 299 to 251 mya |
| | | | Pennsylvanian | | 318 to 299 mya |
| | | | Mississippian | | 359 to 318 mya |
| | | | Devonian | | 416 to 359 mya |
| | | | Silurian | | 443 to 416 mya |
| | | | Ordovician | | 488 to 443 mya |
| | | | Cambrian | | 543 to 488 mya |
| Precambrian | | | | | |
| | Proterozoic | | | | 2,500 to 543 mya |
| | Archean | | | | >3,800 to 2,500 mya |

Deer Lodge County has had an extremely complex and active geologic history, which has been greatly simplified here. Because of the significant mineral deposits in the area, it has been mapped and studied extensively; however, due to the complexity of the geology, not all the geologic maps agree. Formation names for rock units of similar ages are different in several of the mountain ranges, and the structural geology is not completely understood.

The geologic history of Deer Lodge County began approximately 1.5 billion years ago, with the deposition of a very thick sequence of sedimentary rocks known as the Belt Supergroup. Vegetation had not yet developed on the continents, so erosion was extensive. Vast amounts of sediment were deposited into a broad basin that contained exposed mudflats; small beaches; and shallow, probably brackish, water. Sandstone was deposited on beach and near-shore environments; siltstone and shale were deposited in lower energy, deep-water environments; and limestone normally was formed in warm, shallow water.

These sediments continued to accumulate for about 600 million years; some estimates place the total thickness of Belt rocks at a minimum of 60,000 feet (18.3 km) (Harrison, Griggs, and Wells, 1986). Over time, the sediments were metamorphosed by pressure caused by the weight of accumulated sediments and increased temperatures caused by regional volcanic activity. Shale was metamorphosed to argillite, siltstone to siltite, and sandstone to quartzite.

Alternate periods of deposition and erosion have occurred with changing sea levels since the Precambrian Age, producing a thick sedimentary sequence of interbedded sandstone, shale, and limestone. There were long periods, including the early Cambrian, the Ordovician and Silurian, and the upper Triassic through mid-Jurassic, where much of Montana was above sea level. Erosion that occurred during these periods created disconformities, or gaps, in the geologic record. Deer Lodge County contains rocks from every geologic period except those listed above.

The geologic record contains evidence for at least three major periods of tectonism, or mountain building. These occurred during the early Cambrian Period, the late Cretaceous Period, and the early Eocene Epoch. Ongoing seismic activity indicates that tectonic forces are still active in this region.

The most prominent structural features visible today began forming approximately 90-million years ago, in the late Cretaceous Period. At that time, a collision between major tectonic plates to the west created compressional forces that formed the Rocky Mountains. This regional northeast-southwest compression resulted in large-scale folding and faulting. Relatively thin sheets of Belt and Paleozoic rocks were broken into large blocks and thrust up over younger sedimentary rocks in a series of imbricate, or overlapping, faults. These sheets have an internal stratigraphic continuity and are stacked along flat, regionally extensive thrust faults. Accompanying the large-scale faults are numerous closely spaced thrust faults with minor displacement. Continued compression during the late Cretaceous Period subsequently folded, overturned, and faulted the stacks of thrust sheets.

Deer Lodge County lies on the leading edge of one of these large thrust sheets, known as the Sapphire Tectonic Block, which has been displaced an estimated 50 miles (80 km) from the west. The Garnet Range on the north, the Flint Creek Range on the east, and the Anaconda Range on the south define the limits of the Sapphire Tectonic Block. The eastern flank of the Flint Creek Range is tightly folded; it probably was bulldozed into its present position as the Sapphire Tectonic Block advanced.

These multiple events of thrust faulting and folding were followed by widespread episodes of plutonism and volcanism that continued throughout the Cretaceous and early Tertiary periods into the Eocene Epoch. The first plutonic events may have occurred during the last stages of thrust faulting. During this time, melting deep within the crust created masses of magma, or molten rock, that rose toward the surface. As it rose, it deformed and metamorphosed the surrounding country rock and lubricated

planes of thrust faulting. In many areas, hydrothermal activity occurred as these intrusions cooled forming a variety of mineral deposits.

There are numerous stocks and batholiths, most with a granitic composition, in this county. Stocks are igneous intrusions with a surface exposure of less than 40 square miles (100 $km^2$); batholiths are larger. They are frequently associated with smaller sills and dikes. Plutonic complexes form most of the crest and southern flank of the Anaconda Range, the crest of the Flint Creek Range, and the western portion of the Deer Lodge Mountains.

Radiometric dating has been performed on some of the intrusive rocks in the Anaconda Range and the nearby Sapphire Mountains, which are similar in composition and texture. Their ages have been calculated to be between 43 and 78 million years. The Philipsburg Batholith, east of Philipsburg in the Flint Creek Range, has been dated at 73 to 79 million years (Weidman, 1988).

During this period of increased igneous activity, some of the magma rose to the surface and erupted on land, forming large fields of volcanic rocks. The most extensive of these is the Lowland Creek Volcanics, which cover approximately 800 square miles (2,070 $km^2$) in central Deer Lodge and northern Silver Bow counties. The Lowland Creek Volcanics have been dated at 48 to 50 million years.

Mountain building continued into the early Tertiary Period. The Anaconda Range was uplifted and tilted to the north either during or immediately after the final plutonic episode. This uplift was accompanied by high-angle faulting, which offset the igneous rocks and the folded stacks of thrust sheets. Great volumes of sediment were washed into the valleys as the surrounding mountains were uplifted, forming extensive basin-fill deposits. Volcanic eruptions blanketed the area with ash, which was also washed into the valleys. Sediment continued to accumulate in these large basins throughout the Tertiary Period, although the region has been relatively quiet for the last 10 million years.

The character of the basin-fill deposits was affected by the climate, which was arid throughout most of the Tertiary Period, although there were periods during the mid-Miocene Epoch when it was lush and tropical. Lush vegetation prevented widespread erosion, and streams carried relatively fine-grained sediment through permanent channels. It turned dry again ten-million years ago and remained arid until the beginning of the ice ages in the Pleistocene Epoch. As the climate turned from tropical to arid, permanent streams became ephemeral and the character of the sediment changed as well. Coarser-grained sediments were laid down in flash-flood deposits that choked the stream channels and spread across the landscape. The sediments first filled the valleys, which had been created during tropical times, then buried the hills between them.

The Quaternary Period has been dominated by periods of glaciation, volcanism and continuing erosion and deposition. During the ice ages of the Pleistocene Epoch, alpine glaciers covered the high mountain peaks, eroded U-shaped valleys, and deposited linear moraines and glacial outwash in many valleys. At least four separate glacial events are known to have affected the Anaconda Range and three events are known to have affected the Flint Creek Range (Rowan, Trautwein, and Purdy, 1991). The Deer Lodge Mountains have no glacial deposits; they were probably too low to be affected by the ice. The last ice age ended approximately 15,000 years ago.

The landscape has continued to evolve since the end of the last ice age, although the changes are not as dramatic. Today, streams and rivers are reworking alluvial deposits in the active flood plains. These flood plains are subject to overflow from fluctuating water levels during periods of high runoff. Alluvial terraces at higher elevations along the valley floor show former river levels. These older terraces are no longer undergoing active deposition and are relatively stable. There are landslides occurring along steep slopes composed of clayey materials, which are further modifying the topography.

## Geologic Units

The sequence of rocks exposed in Deer Lodge County is summarized below, listed in order of decreasing age. Formations are defined as a succession of strata distinctive enough to constitute a basic unit for mapping, identified by similar rock type and stratigraphic position. Formations can be combined into groups or subdivided into members.

In many cases, outcrop areas for individual formations are small and difficult to differentiate in the field. In these cases, no specific soil series can be correlated with individual geologic formations because of the complexity of the geology. Rock and soil correlations are listed here primarily by rock type, although other factors including elevation, vegetation, slope, and aspect are also considered when a soil series is differentiated.

#### Precambrian Rocks

Rocks deposited during the Precambrian Age consist of the assemblage of formations within the Belt Supergroup. The entire Belt sequence is not completely represented in Deer Lodge County due to the regional thrust faulting. These rocks are hard and thinly bedded and consist primarily of limestone, argillite, siltite, and quartzite.

They occur in large, fault-bounded blocks in a wide, northeast-trending band. This band stretches through the center of the Anaconda Range and along the eastern side of the Flint Creek Range. Belt rocks form the steep cliffs at Lost Creek State Park. They also occur in the southeastern corner of the mapping area in the mountains along the border between Deer Lodge, Silver Bow, and Beaverhead counties. Bear Mountain and the Deep Creek Ski Area both are composed of Belt rocks. Soils typically formed in quartzite include the Elve, Evaro, and Winkler series. Soils typically formed in argillite include the Braziel, Libeg, Worock, and Yreka series.

#### Paleozoic Rocks

Paleozoic rocks exposed in Deer Lodge County consist of a thick sedimentary sequence of mid-Cambrian- to Permian-aged rocks. They are primarily thick-bedded limestone and dolomite, with lesser amounts of carbonate-bearing shale and siltstone, and some sandstone and quartzite. The Paleozoic sequence is not complete due to the regional thrust faulting.

In the Anaconda Range, Paleozoic rocks crop out primarily at Garrity Mountain, between Barker Creek and Big Gulch south of Highway 1. The western portion of the Flint Creek Range is composed of folded stacks of Paleozoic rocks, which are contained within the thrust sheets at the leading edge of the Sapphire Tectonic Block.

No soil series are associated with individual formations in the Paleozoic section; however, they can be classified by rock type. Typical soil series formed on limestone include the Hanson, Lap, Tibson, Whitecow, and Whitore series. Typical soil series formed in dolomite are redder than those formed in limestone and include the Helmville, Relyea, Silverchief, and Trapps series.

#### Mesozoic Rocks

The oldest sedimentary rocks from the Mesozoic Era belong to the Kootenai Formation, which was deposited at the beginning of the Cretaceous Period. Blocks of the Kootenai are incorporated within the internal stratigraphy of the large thrust sheets in the Sapphire Tectonic Block and are located as described above. Other, younger Cretaceous rocks crop out in a northeast-trending band east of Lost Creek State Park, between Antelope Creek and Stucky Ridge.

A wide variety of both extrusive and intrusive rock types associated with the extensive igneous activity of the late Cretaceous and early Tertiary periods occur in the mapping area. These include coarse-grained granitic rocks of the Boulder

Batholith, the Anaconda Batholithic Suite, and the Flint Creek Batholithic Suite. These granitic rocks are characterized by their tendency to weather to rounded, bouldery outcrops. Fine-grained, extrusive rocks belong primarily to the Tertiary-aged Lowland Creek Volcanics. These finer-grained rocks are characterized by their tendency to weather to angular talus slopes.

The Boulder Batholith extends from the Deer Lodge Mountains in the northeastern corner of the mapping area, through Butte, and northeast to the Boulder River. Typical soil series formed on these granitic rocks include the Ambrant, Caseypeak, Comad, Elkner, Ellena, and Tepecreek series.

The Anaconda Batholithic Suite consists of two stocks and two batholiths, all with a granitic composition, that were emplaced during the late Cretaceous and early to mid Eocene Epoch. The stocks and batholiths make up the core of the Anaconda Range and extend into the mapping area near Mount Haggin and Short Peak. Typical soil series formed on these granitic rocks include the Comad and Mohaggin series.

In the mapping area, the Flint Creek Batholithic Suite is represented by the Mount Powell Batholith. It also has a granitic composition and occupies a small area near the mutual boundary of Granite, Powell, and Deer Lodge counties at the northwestern edge of the mapping area. Dikes and sills associated with the Mount Powell Batholith can be seen intruding Belt rocks in the steep cliffs above Lost Creek State Park. Typical soil series formed on these granitic rocks include the Comad and Elkner series.

#### Cenozoic Rocks

Cenozoic rocks in the mapping area consist of the igneous rocks that formed during the extensive igneous activity that began in the late Cretaceous Period and the large thickness of sedimentary basin fill that was deposited in the intermontane basin during the Tertiary Period. The most recent deposits include colluvium, alluvium, terrace gravels, and landslide debris, which are currently being deposited and reworked.

The Lowland Creek Volcanics were erupted approximately 50-million years ago in the Eocene Epoch; these volcanics occupy a large area on the west side of the Deer Lodge Valley just north of Anaconda. The Lowland Creek Volcanics also occur in a large area south of Anaconda where they cover much of the Mount Haggin Wildlife Management Area. The Anaconda smelter stack is constructed on this unit. The volcanics are over 4,000-feet (1,220-m) thick where fully exposed. The Lowland Creek Volcanics consist predominantly of volcanic breccias and flows composed mostly of rhyolite, with minor amounts of andesite and basalt, interbedded with ash-flow tuffs, welded tuffs, and sedimentary strata. In some areas, sedimentary units contain coal beds up to 6-inches (15-cm) thick. Typical soil series formed on these volcanic rocks include the Bendoh, Daras, Karloff, Lowland, Pax, and Vitroff series. Typical soils formed on tuffaceous materials include the Burrfoot, Julius, and Macabre series.

The Tertiary basin fill consists of a variety of sedimentary rock types formed from material that was eroded off the surrounding mountains as they were uplifted. The sedimentary rocks vary widely in both grain size and their degree of consolidation, and individual units grade into and interfinger with each other. Some of the rocks are unconsolidated to semiconsolidated, while some of the rocks are hard and completely lithified. These rocks are interbedded with volcanic materials that are both in-place air fall deposits of volcanic ash and tuff and reworked ash that was eroded off the hills and deposited in the basin fill. Some of the units contain bentonite, formed when volcanic ash weathers under water.

Tertiary sediments are very thick in the Deer Lodge Valley. These sediments are overlain by a thin veneer of glacial outwash to the west of the Clark Fork River and by alluvium near the center of the valley. Tertiary strata underlie the high terraces at the margins of the valley and occur in a wide band east of the Clark Fork River, which

extends the length of the county. This deposit is approximately 6,000 feet (1,830 m) thick near Warm Springs and thicker near the center of the valley.

The Tertiary sediments have been subdivided into two formations in this area—the Renova and the overlying Sixmile Creek. The Renova Formation is a fine-grained deposit consisting of tuffaceous shale and siltstone. The Renova Formation has limited surface exposures in Deer Lodge County but is present at depth in the basin fill.

The Sixmile Creek Formation, coarser grained than the Renova Formation, was deposited in the arid, late Miocene Epoch. The Sixmile Creek Formation is also tuffaceous and consists of interbedded conglomerates, sandstone, shale, and coal. Typical soil series formed from this formation include the Arlen, Litag, and Nivean series. The Mishakal and Wilspring series were formed on sedimentary beds.

Glacial deposits consist primarily of moraine, which are hummocky, unsorted deposits that cover glaciated valley bottoms and extend up the adjacent slopes. In the Anaconda Range, major glacial moraines extend into the mapping area in the following drainages: Mill, Tenmile, Seymour, La Marche, and Fishtrap Creeks. Typical soil series formed on these unconsolidated deposits include the Shawmut series.

One of the most distinctive moraines in the Flint Creek Range is the Racetrack Moraine, located at the southern end of Granite County just north of the Deer Lodge County line. While not as obvious, there are remnants of lateral and terminal moraines along Lost Creek near the junction of Timber Gulch and the canyon of Lost Creek. These moraines are composed of large blocks of granite in a poorly sorted matrix and occur up to an altitude of 6,500 feet (1,980 m).

Quaternary surficial deposits include terrace gravels, colluvium, alluvium, travertine, and landslide deposits. Quaternary surficial deposits are generally unconsolidated and relatively thin. Most of these deposits are originally of glacial origin and have been reworked and transported by the current streams. Recent alluvium includes both coarse-grained channel deposits and fine-grained flood plain deposits. In the Clark Fork Valley, the alluvium has an average thickness of 20 feet (6 m). Fan deposits and cemented colluvium occur near the valley margins. Typical soils derived from alluvium include the Beaverell, Con, Gregson, Kleinschmidt, Saypo, and Sixbeacon series.

Travertine deposits in Deer Lodge County include the 40-foot (12-m) high mound near the hospital at Warm Springs. In addition, there is a 10- to 20-foot (3 to 6 m) thick travertine bed with an exposure area of approximately 1 square mile at the mouth of Warm Springs Creek canyon. Travertine is also exposed on the access road to the smelter stack at Anaconda. Travertine is precipitated in warm, saline lakes and also occurs as mounds and terraces deposited by hot springs. Typical soils derived from travertine deposits are the Lap and Windham series.

Landslides occur on steep terrace slopes composed of clayey Tertiary basin fill or glacial till and in tuffaceous portions of the Lowland Creek Volcanics. Landslides can also occur in most rock types near faults where saturated strata have been weakened by excessive seepage.

## Mineral Resources

Mining has had a significant impact on Deer Lodge County, although perhaps more ground has been disturbed for ore processing than for the actual mines. The first smelter was completed in Anaconda in 1884, processing copper for the Butte mines. A succession of smelters were built and operated near Anaconda until final closure in 1980. Mineral deposits are relatively small by comparison to the surrounding counties. Mining activity has been sporadic since 1864, although exploration for gold and silver was reported for 1992 on Dry Cottonwood Creek northeast of Warm Springs (McCulloch, 1993).

Many small placer deposits in both the Flint and Anaconda Ranges have been worked with varying degrees of success, particularly in the Georgetown Lake area. A placer deposit at Cable Creek, east of Georgetown Lake, is considered to have been the richest deposit; the Dry Gulch deposit near the headwaters of Modesty Creek is considered to have been the most persistent. Gold and silver have been produced from lode mines near Georgetown Lake and in the Mill Creek and Lost Creek drainages.

Most of the mineral production in Deer Lodge County has been gold and silver. Tungsten was produced from the Bonanza Mine just east of Georgetown Lake, and sapphires have been mined from the Dry Cottonwood Creek drainage. Nonmetallic deposits mined in Deer Lodge County include limestone and marble for use as a flux in smelting, tuffaceous clays for use in ceramics and as fire clay, and sand and gravel.

Five wildcat wells were drilled for oil and gas in the Deer Lodge Valley. In 1984, two wells were drilled in Deer Lodge County near Warm Springs to depths of 6,701 and 11,774 feet (2,042 and 3,589 m). Although minor amounts of oil were found, both were abandoned as dry holes.

Coal is included within sedimentary interbeds of the Lowland Creek Volcanics and the Tertiary sediments. The beds are thin and impure and are not considered to be of commercial value.

## Ground-water Resources

The principle sources of ground water in Deer Lodge County are the unconsolidated to partially consolidated Quaternary alluvium and Tertiary basin-fill sediments. The most productive wells are developed in river alluvium. These wells are shallow, with depths ranging between 20 to 150 feet (6 to 46 m), and they have maximum reported yields of 1,500 gpm (5,670 L/min). Water in the alluvial sediments is unconfined, and the water table is subject to seasonal fluctuations.

The water in wells completed in the Tertiary basin-fill sediments is confined, resulting in artesian conditions, although there are no known flowing wells. In general, these sediments are finer grained than the alluvium, and wells have typical yields of 10 to 30 gpm (38 to 113 L/min). Maximum yields of 600 to 700 gpm (2,270 to 2,646 L/min) have been reported from relatively deep wells.

Quantities of water suitable for stock and domestic use can also be developed from joints and fractures in the igneous rocks and from sandstone or limestone beds within the Paleozoic- and Mesozoic-aged formations. Shale formations are saline and impermeable and are not reliable aquifers.

Well use, current to January 1996, for Deer Lodge County is summarized below. This information is contained within the database maintained by the Montana Groundwater Information Center at the Bureau of Mines and Geology in Butte. The list contains 1,290 well records. Many wells have multiple uses (most commonly domestic and stock water) so the sum of the uses appears to be greater than the total number of wells.

| WATER USE | NUMBER OF WELLS |
|---|---|
| Domestic | 1,052 |
| Stock water | 127 |
| Monitoring | 62 |
| Irrigation | 42 |
| Industrial | 25 |
| Public water supply | 22 |
| Unused | 12 |
| Commercial | 8 |

Three wells had reported yields greater than 1,000 gpm (3,780 L/min); 55 wells had reported yields of 100 gpm (378 L/min) or more; and 564 wells had reported yields of 20 gpm (76 L/min) or more. There were 479 wells with yields of 10 gpm (38 L/min) or less. One well had a total depth of 1,498 feet (466 m); 47 had total depths greater than 250 feet (76 m); and 235 had total depths greater than 100 feet (30 m).

## Geothermal Resources

There are several thermal springs of moderate temperature in the Deer Lodge Valley. These include Warm Springs, Anaconda Hot Springs near Opportunity, and Fairmont Hot Springs. The hot water is derived from deep circulation systems within fractured bedrock; the water is brought to the surface through faults underlying the valley fill. The geothermal system of the grounds of the Warm Springs State Hospital shows considerable potential for geothermal energy development; this system has been studied extensively.

## Seismicity

Deer Lodge County is located on the western edge of the intermountain seismic belt, although its seismic activity is relatively quiet for this region. The intermountain seismic belt extends from southern Nevada north to Flathead Lake and contains most of the known active faults in Montana, Idaho, Wyoming, and Utah. It is characterized by shallow seismicity, earthquake swarms, and normal fault scarps that show evidence of Holocene-aged or historic movement.

Seismicity information provided by the Earthquake Studies Office of the Montana Bureau of Mines and Geology shows 96 earthquakes recorded in or near Deer Lodge County since the recordkeeping began in 1982. The maximum magnitude recorded in Deer Lodge County was 3.1, and only three earthquakes had magnitudes greater than 2.5. Earthquakes with magnitudes of 2.0 or less are known as microearthquakes. They are not commonly felt and are recorded only on local seismographs. It is unusual for earthquakes with magnitudes under 4.5 to cause any significant damage.

Deer Lodge County lies in seismic zones 2B and 3, as defined by the Uniform Building Code, 1991. For comparison, southern California and the Hebgen Lake area in Montana are in zone 4, the highest available, and Plentywood, Montana, lies in zone 0.

**Deer Lodge County Hot Springs**

| Location | Flow | | Temperature | | TDS |
|---|---|---|---|---|---|
| | gpm | L/min | °F | °C | mg/L |
| Warm Springs | 60 | 30 | 172° | 78° | 1,250 |
| Anaconda Hot Springs | 3 | 11 | 72° | 22° | 2,310 |
| Fairmont Hot Springs | 40 | 150 | 158° | 70° | 560 |

## Climate

Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon, prepared this section.

Climate tables were created from climate stations Butte FAA Airport, in adjoining Silver Bow County, and Deer Lodge 3 W, in adjoining Powell County. There are no long-term climate stations in Deer Lodge County. Additional information for the

narrative below was extracted from 1961 through 1990 mean annual precipitation and temperature maps of Montana developed by Oregon State University for the U.S. Department of Agriculture, National Resources Conservation Service, using the PRISM system.

Thunderstorm days, relative humidity, percent sunshine, and wind information were estimated from First Order stations Missoula and Helena.

Climate tables on the following pages show data for the period 1971 through 2000 for the survey area as recorded at Butte and Deer Lodge. The “Temperature and Precipitation” table shows average, maximum, and minimum temperature and precipitation data. The “Freeze Dates in Spring and Fall” table shows probable dates of the first freeze in fall and the last freeze in spring. The “Growing Season” table provides data on the probable length of the growing season.

Average annual total precipitation over the soil survey area is variable and dependent on elevation. The driest valley locations around and north of Anaconda receive only about 10 inches of precipitation annually. Annual precipitation is 12.86 inches at Butte and 10.72 inches at Deer Lodge. However, higher elevations of the mapping area receive up to 25 inches of precipitation annually, including around 22 inches along the Continental Divide region. The Big Hole valley region receives between 16 and 20 inches of precipitation. The growing season is ordinarily very short, usually falling between June and August. Usually only about 30 percent of annual precipitation falls during this period at lower elevations. The heaviest 1-day precipitation amounts during the period of record were 2.02 inches at Butte on August 2, 1943, and 2.13 inches at Deer Lodge on July 31, 1997. Thunderstorms occur on about 25 days each year, mostly between June and August.

*Growing-degree days*, equivalent to “heat units,” are shown in the “Temperature and Precipitation” table. During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal growing-degree accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

In summer, the average temperatures are 60 and 59 degrees F, respectively, at Butte and Deer Lodge. Average daily maximum temperatures are 76.4 and 76.9 degrees F, respectively. The highest temperature ever recorded was 100 degrees F at Butte on June 30, 2000, and at Deer Lodge on August 24, 1969.

In winter, average temperatures are 19.2 and 22.4 degrees F, respectively, at Butte and Deer Lodge. Average daily minimum temperatures are 7.1 and 10.5 degrees F, respectively. The lowest temperatures on record are -52 degrees F at Butte on December 23, 1983, and -40 degrees F at Deer Lodge on December 24, 1983.

The average seasonal snowfall is 61.1 inches at Butte and 35.4 inches at Deer Lodge. Lower elevations in the survey area between Anaconda and Deer Lodge receive between 40 and 50 inches of snowfall annually, while higher elevations receive between 80 and 100 inches, with even more over the higher mountains to he west. The greatest snow depths at any one time during the period of record were 27 inches at Butte on December 28, 1996, and 28 inches at Deer Lodge on February 8, 1975. On average, 107 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfalls on record were 12.8 inches at Butte on October 31, 1973, and 14.8 inches at Deer Lodge on February 7, 1975.

The average relative humidity in midafternoon is about 30 percent in summer and about 70 percent in winter. Humidity is higher at night, and the average at dawn is about 80 percent in most months. The sun shines about 72 percent of the time in summer and about 40 percent in winter. The prevailing wind is highly dependent on terrain. Usually the prevailing wind follows the valleys, with south winds for much of the year in the main valley, but also from the north a good percentage of the time. Average wind speed is highest, around 9 miles per hour, in April and May.

## 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.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. 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, 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.

**Temperature and Precipitation**

**(Recorded in the period 1971 through 2000 at Butte and Deer Lodge)**

| Month | Temperature (degrees F) | | | | | Precipitation (inches) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Average | 2 years in 10 will have— Maximum temperature more than | 2 years in 10 will have— Minimum temperature less than | Average number of growing degree days* | Average | 2 years in 10 will have— Less than | 2 years in 10 will have— More than | Average number of days with 0.10 or more | Average total snowfall |
| BUTTE: | | | | | | | | | | | |
| January---- | 29.6 | 5.8 | 17.7 | 51 | -34 | 2 | 0.55 | 0.21 | 0.82 | 1 | 8.3 |
| February--- | 34.7 | 9.7 | 22.2 | 55 | -32 | 2 | 0.47 | 0.23 | 0.70 | 1 | 7.6 |
| March------ | 42.0 | 18.5 | 30.3 | 64 | -16 | 14 | 0.84 | 0.52 | 1.13 | 2 | 10.9 |
| April------ | 51.7 | 26.4 | 39.0 | 76 | 5 | 85 | 1.03 | 0.47 | 1.57 | 3 | 8.5 |
| May-------- | 60.8 | 34.3 | 47.6 | 83 | 18 | 252 | 2.02 | 1.15 | 2.80 | 5 | 3.3 |
| June------- | 70.7 | 41.3 | 56.0 | 91 | 28 | 480 | 2.07 | 0.93 | 3.08 | 5 | 0.2 |
| July------- | 79.6 | 45.5 | 62.6 | 94 | 32 | 697 | 1.51 | 0.49 | 2.42 | 4 | 0.0 |
| August----- | 79.0 | 44.1 | 61.5 | 94 | 30 | 667 | 1.36 | 0.57 | 2.12 | 4 | 0.3 |
| September-- | 67.8 | 35.3 | 51.5 | 89 | 18 | 356 | 1.09 | 0.30 | 1.82 | 3 | 1.1 |
| October---- | 55.5 | 26.3 | 40.9 | 79 | 1 | 115 | 0.80 | 0.31 | 1.22 | 2 | 4.5 |
| November--- | 38.9 | 15.3 | 27.1 | 63 | -20 | 15 | 0.60 | 0.30 | 0.87 | 1 | 7.6 |
| December--- | 29.8 | 5.7 | 17.7 | 52 | -32 | 2 | 0.53 | 0.24 | 0.78 | 1 | 8.9 |
| Yearly: | | | | | | | | | | | |
| Average-- | 53.4 | 25.7 | 39.5 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme-- | 100.0 | -52.0 | --- | 96 | -41 | --- | --- | --- | --- | --- | --- |
| Total---- | --- | --- | --- | --- | --- | 2,686 | 12.86 | 9.77 | 15.43 | 32 | 61.1 |
| Average number of days per year with at least 1 inch of snow on the ground: 107 | | | | | | | | | | | |
| DEER LODGE: | | | | | | | | | | | |
| January---- | 32.4 | 8.6 | 20.5 | 53 | -28 | 2 | 0.33 | 0.06 | 0.54 | 0 | 7.0 |
| February--- | 37.9 | 13.5 | 25.7 | 59 | -26 | 6 | 0.30 | 0.08 | 0.51 | 1 | 5.6 |
| March------ | 45.8 | 20.3 | 33.1 | 67 | -8 | 24 | 0.50 | 0.16 | 0.80 | 1 | 7.8 |
| April------ | 55.1 | 25.6 | 40.3 | 78 | 8 | 100 | 0.71 | 0.24 | 1.19 | 2 | 3.3 |
| May-------- | 62.7 | 32.8 | 47.8 | 83 | 17 | 255 | 1.99 | 1.15 | 2.71 | 6 | 0.0 |
| June------- | 72.1 | 39.4 | 55.7 | 90 | 26 | 468 | 1.57 | 0.80 | 2.26 | 5 | 0.0 |
| July------- | 79.1 | 42.7 | 60.9 | 94 | 29 | 648 | 1.50 | 0.51 | 2.37 | 4 | 0.0 |
| August----- | 79.5 | 41.0 | 60.3 | 95 | 27 | 620 | 1.38 | 0.61 | 2.13 | 4 | 0.0 |
| September-- | 69.7 | 32.8 | 51.2 | 90 | 16 | 340 | 1.14 | 0.27 | 1.90 | 3 | 0.0 |
| October---- | 57.9 | 25.2 | 41.6 | 81 | 4 | 126 | 0.55 | 0.20 | 0.73 | 2 | 1.2 |
| November--- | 41.4 | 16.1 | 28.8 | 65 | -15 | 19 | 0.38 | 0.14 | 0.62 | 1 | 4.9 |
| December--- | 32.9 | 9.4 | 21.1 | 55 | -26 | 4 | 0.38 | 0.13 | 0.54 | 1 | 5.5 |
| Yearly: | | | | | | | | | | | |
| Average-- | 55.6 | 25.6 | 40.6 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme-- | 98.0 | -40.0 | --- | 96 | -34 | --- | --- | --- | --- | --- | --- |
| Total---- | --- | --- | --- | --- | --- | 2,613 | 10.72 | 6.01 | 12.92 | 30 | 35.4 |
| Average number of days per year with at least 1 inch of snow on the ground: 31 | | | | | | | | | | | |

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Freeze Dates in Spring and Fall

(Recorded in the period 1971 through 2000 at Butte and Deer Lodge)

| Probability | Temperature | | |
|---|---|---|---|
| | 24 degrees F or lower | 28 degrees F or lower | 32 degrees F or lower |
| BUTTE: | | | |
| Last freezing temperature in spring: January-July | | | |
| 1 year in 10 later than----- | May 22 | June 15 | July 7 |
| 2 years in 10 later than---- | May 16 | June 8 | July 1 |
| 5 years in 10 later than---- | May 5 | May 25 | June 19 |
| First freezing temperature in fall: August-December | | | |
| 1 year in 10 earlier than--- | September 11 | September 4 | August 20 |
| 2 years in 10 earlier than-- | September 16 | September 8 | August 25 |
| 5 years in 10 earlier than-- | September 25 | September 14 | September 2 |
| DEER LODGE: | | | |
| Last freezing temperature in spring: January-July | | | |
| 1 year in 10 later than----- | June 5 | July 5 | July 19 |
| 2 years in 10 later than---- | May 30 | June 28 | July 13 |
| 5 years in 10 later than---- | May 17 | June 13 | July 2 |
| First freezing temperature in fall: August-December | | | |
| 1 year in 10 earlier than--- | September 1 | August 22 | August 8 |
| 2 years in 10 earlier than-- | September 6 | August 26 | August 14 |
| 5 years in 10 earlier than-- | September 14 | September 5 | August 24 |

Growing Season

(Recorded in the period 1971 through 2000 at Butte and Deer Lodge)

| Probability | Daily minimum temperature | | |
|---|---|---|---|
| | Higher than 24 degrees F | Higher than 28 degrees F | Higher than 32 degrees F |
| | *Days* | *Days* | *Days* |
| BUTTE: | | | |
| 9 years in 10---------- | 118 | 87 | 51 |
| 8 years in 10---------- | 126 | 95 | 59 |
| 5 years in 10---------- | 142 | 111 | 74 |
| 2 years in 10---------- | 157 | 127 | 89 |
| 1 year in 10---------- | 165 | 135 | 96 |
| DEER LODGE: | | | |
| 9 years in 10---------- | 98 | 61 | 31 |
| 8 years in 10---------- | 105 | 69 | 40 |
| 5 years in 10---------- | 120 | 84 | 56 |
| 2 years in 10---------- | 135 | 100 | 72 |
| 1 year in 10---------- | 143 | 108 | 81 |

# Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, “Taxonomic Classification of the Soils” and “Acreage and Proportionate Extent of the Soils,” show the classification and extent of the soils in this survey area.

## Factors of Soil Formation

Soil is a natural, three-dimensional body on the earth’s surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, the physical and chemical composition of the parent material, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed.

### Parent Material

Parent material is the unconsolidated mass in which a soil forms. It strongly affects the chemical and mineralogical composition of the soil. The soils in the Deer Lodge County Area formed in many different kinds of parent materials. The major materials are recent alluvium, glacial alluvium, mixed alluvium and colluvium, soft bedrock, hard bedrock, and volcanic mudflows.

Recent alluvium is water-deposited material on the bottomlands and low terraces along the major streams and rivers. These soils contain varying amounts of sand, silt, and clay. Many of them contain rounded gravel, cobbles, and stones. Soils formed on these positions lack significant soil development; they tend to be stratified. Many soils are still subject to flooding.

Glacial alluvium is material deposited by glacial melt water. This material is on terraces and outwash plains throughout the county. The deposits range from Pleistocene to Miocene Ages. These soils contain varying amounts of sand, silt, and clay with large amounts of gravel and cobbles. The soils formed in these materials generally have good horizon development.

The combined forces of gravity and water have deposited mixed alluvium and colluvium. They consist of materials that have been moved downslope from higher areas and redeposited on footslopes, alluvial fans, and along drainageways. They contain varying amounts of silt and clay with lesser amounts of sand. Soils formed in these materials show varying degrees of development, depending upon the other soil-forming factors.

Material weathered from soft bedrock formations is a major parent material in the uplands in this survey area. Most of these materials are calcareous. The soils formed

in place, or they formed in material that was locally reworked and transported by water and wind. These deposits range in thickness from a few inches to several feet over the underlying bedrock.

Material weathered from hard sandstone is another parent material for many upland soils. These deposits range from a few inches to a little over a foot in thickness. They formed in place and include large amounts of angular sandstone channers. Soils formed in this material typically have weakly expressed horizons.

## Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. Climate indirectly affects soil formation through its effect on the kind and amount of living organisms on and in the soil. Vegetation and organisms decay to produce organic matter in the soil. Soils that have cool temperatures and high precipitation generally contain more organic matter and are dark colored. Soils that have warm temperatures and low precipitation generally contain less organic matter and are light colored.

Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

## Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its effect on drainage and runoff. The degree of slope, shape of the land surface, and permeability of the soil determine the rate of runoff, internal drainage, and moisture content of the soil.

The number and distinctness of soil horizons generally decrease as slope increases. Soils on steep slopes with rapid runoff have many characteristics similar to those of soils formed in arid climates. Soils on east- and north-facing slopes have cooler temperatures than those on west- and south-facing slopes. East- and north-facing slopes receive less sunlight. As a result, the soils on these slopes retain water longer and are cooler than soils on west- and south-facing slopes. The surface soil is darker and the depth to lime is generally deeper on north-facing slopes than on south-facing slopes. In some parts of the survey area, these differences are pronounced.

The soil horizons on gently sloping surfaces are generally more distinct than soils formed in similar parent material on steep and very steep surfaces. Gently sloping soils absorb more moisture, and water is retained in the soil to a greater depth. Soils on steeper slopes generally have a thinner, lighter colored surface layer and a shallower depth to lime than soils formed on lesser slopes. Erosion caused by the runoff on steeper soils also restricts the formation of distinct soil horizons.

## Living Organisms

Living organisms are active in the formation of soils. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure.

The kinds and amounts of living organisms are determined by soil-forming factors, such as climate and topography.

Roots, rodents, and insects penetrate the soil and alter its structure. The deep, fibrous root system of grasses improves the porosity and structure of the soil. Because of this porosity, the activity of microbes, earthworms, and burrowing

animals increases. Animals, in turn, increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Deep roots transport minerals and plant nutrients to the surface, thus improving fertility. Under coniferous trees, needles that drop to the soil surface increase the acidity of the soil.

Some organisms in the soil take in nitrogen from the air and incorporate it into plant tissues. After these organisms die, the nitrogen is released in various forms and becomes available to plants.

Soils under forest plants tend to be cooler than soils under grassland plants. Wet soils have less oxygen available to microbes than drier soils. The activity of microorganisms and animals is less extensive in cooler, wetter soils. As a result, organic matter is broken down more slowly and more organic litter remains on the surface of the soil.

## Time

Change taking place in soils over a long period is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of these horizons are called soil morphology. These layers are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Soils are classified according to their approximate age, from young to mature. Age, or maturity, of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Young soils show very little profile development. Wetsand soils are considered a young soil. They are on flood plains and are inundated by water at some times. The parent material has been in place for a short time. This soil has little accumulation of organic matter, and there has been no clay movement within the soil. The soil profile has thin strata of water lain material that has not been altered, and the soil is limy up to the surface.

The Anaconda soil formed in parent material that is similar to the parent material of the Wetsand soil but is older. The soil material has been in place longer and time has had longer to affect this soil. The surface layer is darker and thicker than the Wetsand soil, and lime has leached out of the surface soil. This soil has very little subsoil development.

The Martinsdale soil is an example of a mature soil. It has extensive alteration of the subsoil. Fine clay particles have moved out of the surface soil and been deposited in the subsoil. Lime and soluble minerals have leached out of the subsoil and been redeposited in a layer of increased lime content below the subsoil. The passage of time has effected a great deal of change in the original water-lain parent material.

Many of the sloping and steep, shallow, and very shallow soils appear to have been in the process of formation for about as long as some of the more developed, less sloping soils. However, erosion has removed the soil as fast as it formed. In this case, the effect of time has been offset by the effect of relief.

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Taxonomic Classification of the Soils," shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisols, from *mollis*, meaning soft.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning having an argillic horizon or clay accumulation, plus *ustoll*, the suborder of the Mollisols that has a dry climate).

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, frigid Typic Argiustolls.

SERIES. The series consists of soils within a family that have horizons similar in arrangement in the profile, color, consistence, mineral and chemical composition, reaction, structure, and texture. An example is the Clasoil series. The soils in the Clasoil series are fine-loamy, mixed, superactive, frigid Typic Argiustolls.

The table "Taxonomic Classification of the Soils" indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

## *Adel Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Drainageways on alluvial fans
*Parent material:* Alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 5,000 to 7,400 feet
*Annual precipitation:* 15 to 23 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive Pachic Haplocryolls

### Typical Pedon

Adel loam, in an area of Adel-Mooseflat complex, 8 to 35 percent slopes, in an area of aspen, 1,100 feet south and 1,700 feet east of the northwest corner of sec. 36, T. 10 N., R. 13 W.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.

A1—2 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many irregular pores; 1 percent gravel; neutral; clear smooth boundary.

A2—6 to 8 inches; dark brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky, slightly plastic; common very fine, fine, and medium roots; few very fine tubular pores; 1 percent gravel; neutral; clear smooth boundary.

Bw1—8 to 24 inches; very dark gray (10YR 3/1) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 1 percent gravel; neutral; clear smooth boundary.

Bw2—24 to 36 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 1 percent gravel; neutral; clear wavy boundary.

Bw3—36 to 60 inches; brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine, fine, and medium discontinuous tubular pores; 15 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 16 to 60 inches

*A horizons*
Value: 2 to 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 10 percent gravel
Reaction: pH 6.1 to 7.3

*Bw horizons*
Value: 3 to 5 dry; 2 to 4 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel
Reaction: pH 6.1 to 7.8

## *Aeric Fluvaquents*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour), moderately slow (0.2 to 0.6 inch/hour), or rapid (6 to 20 inches/hour)
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 4,700 to 5,100 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Aeric Fluvaquents

### Typical Pedon

Aeric Fluvaquents, 0 to 2 percent slopes, in an area of pasture, 200 feet west and 1,200 feet north of the southeast corner of sec. 24, T. 5 N., R. 10 W.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) very cobbly clay loam, pale brown (10YR 6/3) dry; moderate medium granular structure; hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; 20 percent cobbles; 25 percent gravel; violently effervescent; moderately alkaline; gradual smooth boundary.

C1—10 to 16 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, light brownish gray (10YR 6/2) dry; few fine redox concentrations; massive; soft, very friable, slightly sticky, moderately plastic; few very fine roots; 20 percent cobbles; 40 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

2C2—16 to 60 inches; brown (10YR 5/3) extremely gravelly sand, light brownish gray (10YR 6/2) dry; few fine redox concentrations; single grain; loose, nonsticky, nonplastic; few very fine roots in top 2 inches; 10 percent cobbles; 65 percent gravel; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Depth to the seasonal high water table:* 12 to 24 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 25 to 40 percent gravel
Reaction: pH 7.4 to 8.4

*C1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 20 to 30 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 30 to 50 percent gravel
Reaction: pH 7.4 to 8.4

*2C2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Sand or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 70 percent—10 to 25 percent cobbles; 30 to 65 percent gravel
Reaction: pH 7.4 to 8.4

## *Ambrant Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountain side slopes
*Parent material:* Colluvium from granite
*Slope range:* 15 to 60 percent
*Elevation range:* 5,000 to 7,400 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Lamellic Haplustepts

### Typical Pedon

Ambrant bouldery coarse sandy loam, in an area of Ambrant-Rochester-Rock outcrop complex, 15 to 35 percent slopes, in an area of woodland, 2,600 feet north and 2,200 feet east of the southwest corner of sec. 19, T. 6 N., R. 8 W.

Oi—0 to 2 inches; slightly decomposed forest litter.
A—2 to 7 inches; brown (10YR 4/3) bouldery coarse sandy loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, friable,

nonsticky, nonplastic; common fine and medium and many very fine roots; common fine and many very fine discontinuous interstitial pores; 20 percent boulders; 5 percent stones; 5 percent gravel; neutral; clear wavy boundary.

E—7 to 15 inches; brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, friable, nonsticky, nonplastic; few coarse, common fine, and many very fine roots; common fine and many very fine discontinuous interstitial pores; 15 percent gravel; neutral; clear wavy boundary.

E & Bt—15 to 30 inches; E part (80 percent) is light brownish gray (10YR 6/2) cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; B part (20 percent) is brown (10YR 4/3) sandy loam lamellae dark brown (10YR 3/3) moist; texture mixed is cobbly sandy loam; moderate medium and coarse subangular blocky structure; soft, friable, nonsticky, nonplastic; few coarse, common fine, and many very fine roots; common fine and many very fine discontinuous interstitial pores; 10 percent cobbles; 15 percent gravel; slightly acid; clear wavy boundary.

2C—30 to 60 inches; yellowish brown (10YR 5/4) very cobbly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, friable, nonsticky, nonplastic; common very fine and fine roots; common fine and many very fine discontinuous interstitial pores; 20 percent cobbles; 25 percent gravel; slightly acid.

## Range in Characteristics

*Soil temperature:* 40 to 47 degrees F
*Moisture control section:* Between 8 and 24 inches
*Depth to the 2C horizon:* 28 to 46 inches
*Note:* Some pedons do not have an A horizon.

*A horizon*
Texture: Sandy loam or coarse sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—5 to 25 percent boulders or stones; 0 to 10 percent gravel
Reaction: pH 5.6 to 7.3

*E horizon*
Texture: Loamy sand, sandy loam, or loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.3

*E & Bt horizon*
Texture: Loamy sand or sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.3

*2C horizon*
Texture: Sand, loamy sand, or loamy coarse sand
Clay content: 0 to 5 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Anaconda Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Stream terraces and alluvial fans
*Parent material:* Calcareous alluvium
*Slope range:* 0 to 35 percent
*Elevation range:* 4,000 to 5,900 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 43 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Aridic Haplustolls

### Typical Pedon

Anaconda sandy loam, 0 to 4 percent slopes, moderately impacted, in an area of rangeland, 3,000 feet east and 1,800 feet north of the southwest corner of sec. 13, T. 4 N., R. 10 W.

A1—0 to 2 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common fine interstitial pores; 5 percent gravel; strongly acid; clear smooth boundary.

A2—2 to 8 inches; dark brown (10YR 3/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common fine interstitial pores; 5 percent gravel; moderately acid; clear smooth boundary.

Bw—8 to 15 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few medium and common very fine and fine roots; common fine interstitial pores; 10 percent gravel; neutral; clear smooth boundary.

Bk1—15 to 25 inches; light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 4/3) moist; weak moderate subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common very fine roots; common fine interstitial pores; 10 percent gravel; common fine threads of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—25 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common fine interstitial pores; 10 percent gravel; common fine threads of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 8 and 24 inches; dry in all parts between four tenths and five tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the calcic horizon:* 10 to 16 inches

*A horizons*
Value: 3 to 5 dry
Chroma: 2 or 3

Texture: Sandy loam or loam
Clay content: 5 to 18 percent
Content of rock fragments: 0 to 10 percent gravel
Reaction: pH 5.1 to 7.3

*Bw horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or coarse sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.3

*Bk horizons*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or coarse sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

## *Aquic Cumulic Haplustolls*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,600 to 5,100 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Aquic Cumulic Haplustolls

### Typical Pedon

Aquic Cumulic Haplustolls, in an area of Slickens-Aridic Ustifluvents-Aquic Cumulic Haplustolls complex, 0 to 2 percent slopes, severely impacted, in an area of pasture, 300 feet west and 1,200 feet south of the northeast corner of sec. 26, T. 4 S., R. 10 W.

C—0 to 10 inches; light yellowish brown (10YR 6/4) stratified tailings and fine sandy loam sediment, yellowish brown (10YR 5/4) moist; moderate very thin platy structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; very strongly acid; clear smooth boundary.

Ab—10 to 12 inches; very dark gray (2.5Y 3/1) and grayish brown (2.5Y 5/2) loam, black (2.5Y 2/1) moist; weak medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; neutral; clear smooth boundary.

Bwb—12 to 30 inches; grayish brown (2.5Y 5/2) loam, very dark gray (2.5Y 3/1) moist; weak medium and coarse subangular blocky structure; hard, friable, moderately sticky, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular pores; disseminated lime; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A'b—30 to 38 inches; dark gray (2.5Y 4/1) clay loam, black (2.5Y 2/1) moist; many fine and medium redox depletions; strong fine and medium granular structure; hard, friable, moderately sticky, moderately plastic; few very fine, fine, and medium roots; few fine and common very fine tubular pores; slightly alkaline; clear smooth boundary.

Cg—38 to 55 inches; light brownish gray (10YR 6/2) loam with two very fine seams of loamy sand, very dark gray (10YR 3/1) moist; common medium prominent strong brown (7.5YR 5/6) dry redox concentrations; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine, fine, and medium tubular pores; 1 percent gravel; very strongly acid; clear smooth boundary.

2C—55 to 62 inches; strong brown (7.5YR 5/8) very gravelly coarse sand, strong brown (7.5YR 4/6) moist; many coarse prominent strong brown (7.5YR 5/8) dry redox concentrations; single grain; loose, nonsticky, nonplastic; 50 percent gravel; extremely acid.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Thickness of the mollic epipedon:* 16 to 40 inches
*Depth to the seasonal high water table:* 24 to 42 inches

*C horizon*
Hue: 10YR or 7.5YR
Value: 4 to 6
Chroma: 4 or 6
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 4.5 to 6.0

*Ab and Bwb horizons*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Loam or fine sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.1 to 7.8

*A'b horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 7.8

*Cg horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 2 to 4 moist
Chroma: 1 or 2
Texture: Loam or fine sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 4.5 to 7.8

*2C horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 4, 6, or 8
Texture: Sand or coarse sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 55 percent gravel
Reaction: pH 3.5 to 7.8

## *Arents*

*Depth class:* Very deep (greater than 60 inches)

*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 15 inches, rapid (6 to 20 inches/hour) below
*Slope range:* 1 to 45 percent
*Elevation range:* 5,080 to 5,300 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Arents

### Typical Pedon

Arents, 30 to 45 percent slopes, in an area of revegetated slickens, 50 feet south and 800 feet west of the northeast corner of sec. 7, T. 4 N., R. 11 W.

C1—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, very friable, slightly sticky, moderately plastic; common fine and many very fine roots; common very fine tubular pores; 5 percent gravel; strongly effervescent; slightly alkaline; clear smooth boundary.
C2—6 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, soft, slightly sticky, slightly plastic; strongly effervescent; common very fine and fine roots; few very fine tubular pores; 2 percent gravel; slightly alkaline; abrupt smooth boundary.
C3—15 to 22 inches; white (N 8/) lime rock that crushes to very gravelly loamy sand, gray (10YR 6/1) moist; massive; very hard, very firm, nonsticky, nonplastic; few very fine roots in top 1 to 2 inches; 1/4-inch thick discontinuous iron pan forming at top of horizon; 50 percent gravel less than 1 inch in size; violently effervescent; moderately alkaline; abrupt smooth boundary.
C4—22 to 60 inches; pale yellow (2.5Y 8/3) loamy fine sand tailings; olive (5Y 7/3) moist; single grain; loose, nonsticky, nonplastic; many soft small dark brown (7.5YR 5/6) iron concretions; extremely acid.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*C1 horizon*
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*C2 horizon*
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*C3 horizon*
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

*C4 horizon*
Clay content: 0 to 10 percent
Reaction: pH 3.5 to 4.4

## *Aridic Ustifluvents*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Moderately well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 30 inches, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,700 to 5,100 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Aridic Ustifluvents

### Typical Pedon

Aridic Ustifluvents, in an area of Aquic Cumulic Haplustolls-Aridic Ustifluvents-Slickens complex, 0 to 2 percent slopes, severely impacted, in an area of pasture, 450 feet east and 900 feet south of the northwest corner of sec. 36, T. 4 N., R. 10 W.

Oi—0 to 1/2 inch; partially decomposed roots, twigs, and leaves.
C1—1/2 to 9 inches; light yellowish brown (10YR 6/4) fine sandy loam consisting of stratified loam to loamy sand, brown (10YR 4/3) moist; common fine oxidized mine tailings; strong brown (7.5YR 5/8) dry; weak fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; 1 percent gravel; moderately acid; clear smooth boundary.
C2—9 to 30 inches; light yellowish brown (2.5Y 6/3) fine sandy loam consisting of stratified loam to loamy sand, very dark grayish brown (2.5Y 3/2) moist; few fine oxidized mine tailings; strong brown (7.5YR 5/6) dry; massive; slightly hard, very friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; few very fine and fine tubular pores; 1 percent gravel; slightly acid; gradual smooth boundary.
C3—30 to 42 inches; light brownish gray (2.5Y 6/2) fine sandy loam consisting of stratified loamy sand to sandy loam, very dark grayish brown (2.5Y 3/2) moist; few fine oxidized mine tailings; strong brown (7.5YR 5/6) dry; massive; soft, very

friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 1 percent gravel; slightly alkaline; clear smooth boundary.

C4—42 to 61 inches; light yellowish brown (2.5Y 6/3) very gravelly loamy sand, dark olive brown (2.5Y 3/3) moist; common fine oxidized mine tailings; strong brown (7.5YR 5/8) dry; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine tubular pores; 10 percent cobbles; 40 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Depth to the seasonal high water table:* 42 to 60 inches

*C1 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 10 to 20 percent
Reaction: pH 5.1 to 7.3

*C2 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 10 to 20 percent
Reaction: pH 5.6 to 7.3

*C3 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 8.4

*C4 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel
Reaction: pH 6.6 to 8.4

## *Aridic Ustorthents*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Slope range:* 1 to 35 percent
*Elevation range:* 5,080 to 5,600 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Aridic Ustorthents

## Typical Pedon

Aridic Ustorthents, 8 to 15 percent slopes, in an area of range reclamation, 2,300 feet north and 300 feet east of the southwest corner of sec. 7, T. 4 N., R. 10 W.

A—0 to 11 inches; light olive brown (2.5Y 5/3) very cobbly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine interstitial pores; 25 percent rounded cobbles; 25 percent rounded gravel; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—11 to 20 inches; light brownish gray (10YR 6/2) very gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, moderately sticky, very plastic; violently effervescent; 5 percent cobbles; 35 percent angular gravel; slightly alkaline; clear wavy boundary.

C2—20 to 28 inches; light brownish gray (10YR 6/2) gravelly sandy clay loam, grayish brown (10YR 5/2) moist; massive; very hard, very firm, moderately sticky, moderately plastic; 20 percent rounded rhyolite gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

C3—28 to 60 inches; light brownish gray (10YR 6/2) gravelly sandy clay loam, grayish brown (10YR 5/2) moist; massive; very hard, very firm, moderately sticky, moderately plastic; 5 percent cobbles; 25 percent rounded rhyolite gravel; slightly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*A horizon*

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 28 to 35 percent
Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 25 to 45 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 7.4 to 8.4

*C1 horizon*

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or sandy clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 15 to 50 percent—0 to 5 percent cobbles; 20 to 45 percent gravel
Reaction: pH 7.4 to 8.4

*C2 and C3 horizons*

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or sandy clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 35 percent gravel
Reaction: pH 7.4 to 8.4

## *Aridic Ustorthents, clayey substratum*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Slope range:* 35 to 60 percent
*Elevation range:* 4,700 to 5,400 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Aridic Ustorthents

### Typical Pedon

Aridic Ustorthents, clayey substratum, 4 to 15 percent slopes, in an area of golf course reclamation, 2,000 feet west and 400 feet south of the northeast corner of sec. 2, T. 4 N., R. 11 W.

A—0 to 2 inches; light olive brown (2.5Y 5/3) coarse sandy loam, brown (10YR 4/3) moist; weak medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine interstitial pores; 5 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1—2 to 10 inches; light yellowish brown (10YR 6/3) cobbly clay loam, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, moderately sticky, very plastic; slightly effervescent; 1 percent stones; 15 percent cobbles; 10 percent gravel; slightly alkaline; clear wavy boundary.

C2—10 to 14 inches; light yellowish brown (2.5Y 6/4) cobbly clay loam, brown (10YR 5/3) moist; massive; very hard, very firm, moderately sticky, very plastic; 1 percent stones; 15 percent cobbles; 5 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

C3—14 to 22 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, moderately sticky, very plastic; 5 percent gravel; slightly alkaline; clear wavy boundary.

C4—22 to 29 inches; light gray (2.5Y 7/2) clay loam, brown (10YR 5/3) moist; massive; hard, friable, moderately sticky, moderately plastic; few very fine interstitial pores; 10 percent gravel; slightly alkaline; abrupt wavy boundary.

Ab—29 to 60 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; massive; extremely hard, very firm, moderately sticky, very plastic; 5 percent gravel; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 2 to 4
- Clay content: 10 to 20 percent
- Content of rock fragments: 0 to 15 percent gravel
- Calcium carbonate equivalent: 5 to 10 percent
- Reaction: pH 7.4 to 8.4

*C1, C2, and C3 horizons*
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4 to 6 moist
- Chroma: 2 to 4

Texture: Clay loam or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 7.4 to 8.4

*C4 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 30 to 40 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

*Ab horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 or 3
Clay content: 35 to 40 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

## *Arlen Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Crests, ridges, and side slopes of mountains and hills
*Parent material:* Residuum from welded tuff
*Slope range:* 8 to 60 percent
*Elevation range:* 5,200 to 6,200 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy-skeletal, glassy, calcareous, frigid Lithic Ustorthents

### Typical Pedon

Arlen very gravelly ashy sandy loam, in an area of Arlen-Caramon-Rock outcrop complex, 15 to 60 percent slopes, severely impacted, in an area of woodland, 1,700 feet east and 1,600 feet north of the southwest corner of sec. 18, T. 5 N., R. 10 W.

A—0 to 3 inches; light gray (2.5Y 7/2) very gravelly ashy sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and common very fine roots; 10 percent cobbles; 30 percent gravel; slightly alkaline; abrupt wavy boundary.

BCk—3 to 9 inches; light gray (2.5Y 7/2) very gravelly ashy sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; 10 percent cobbles; 40 percent gravel; common fine threads and masses of lime; slightly effervescent; slightly alkaline; clear wavy boundary.

Cr—9 to 13 inches; light gray (2.5Y 7/2) decomposing welded tuff bedrock.

R—13 inches; light gray (5Y 7/1) fractured hard welded tuff bedrock.

### Range in Characteristics

*Soil temperature:* 38 to 42 degrees F
*Moisture control section:* Between 4 and 12 inches or between 4 inches and the paralithic contact if less than 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the Cr horizon:* 8 to 17 inches
*Depth to bedrock:* 11 to 18 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 3 to 7 dry; 2 to 4 moist
Chroma: 1 or 2
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent gravel
Reaction: pH 6.6 to 7.8

*BCk horizon*
Hue: 10YR or 2.5Y
Value: 4 to 7 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 10 to 24 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent stones and cobbles; 30 to 40 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 6.6 to 7.8

## *Bata Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Colluvium from argillite
*Slope range:* 15 to 35 percent
*Elevation range:* 6,300 to 7,400 feet
*Annual precipitation:* 25 to 40 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Glossocryalfs

### Typical Pedon

Bata gravelly ashy loam, mod temp, 15 to 35 percent slopes, in an area of woodland, 1,200 feet west and 1,450 feet north of the southeast corner of sec. 33, T. 6 N., R. 11 W.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
Bw—2 to 9 inches; light yellowish brown (10YR 6/4) gravelly ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common coarse and many fine and medium roots; many very fine irregular pores; 5 percent cobbles; 25 percent gravel; moderately acid; clear smooth boundary.

2E/Bt—9 to 22 inches; E part (80 percent) is light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; interfingering into B part; B part (20 percent) is brown (10YR 5/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; texture mixed is very gravelly clay loam; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few very fine and fine tubular pores; 15 percent cobbles; 40 percent gravel; moderately acid; clear smooth boundary.

2Bt—22 to 60 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few medium and common very fine and fine roots; common fine tubular pores; few distinct clay films on faces of peds and lining pores; 15 percent cobbles; 40 percent gravel; slightly acid.

### Range in Characteristics

*Soil temperature:* 37 to 40 degrees F
*Moisture control section:* Between 4 and 12 inches

*Bw horizon*
Value: 5 or 6 dry: 4 or 5 moist
Chroma: 4 or 6
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent gravel
Acid oxalate extractable Fe + Al: More than 1 percent
Moist bulk density: 1 g/cm$^3$ or less
Reaction: pH 5.1 to 6.5

*2E/Bt horizon*
Value: E part: 6 to 8 dry; 5 or 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: E part: 2 to 4; B part: 3 or 4
Clay content: 12 to 25 percent
Content of rock fragments: 25 to 60 percent—0 to 15 percent stones and cobbles; 25 to 50 percent gravel
Reaction: pH 5.6 to 6.5

*2Bt horizon*
Value: 5 to 7 dry: 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent stones and cobbles; 35 to 50 percent gravel
Reaction: pH 5.6 to 6.5

## *Bearmouth Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate to 14 inches (0.6 to 2.0 inches/hour), rapid (6 to 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 2 to 4 percent
*Elevation range:* 5,700 to 6,200 feet
*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 36 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Sandy-skeletal, mixed Ustic Haplocryolls

## Typical Pedon

Bearmouth gravelly loam, 2 to 8 percent slopes, in an area of irrigated hay, 600 feet east and 1,900 feet south of the northwest corner of sec. 23, T. 1 N., R. 14 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; few fine interstitial pores; 5 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.

Bw1—3 to 10 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; 5 percent cobbles; 5 percent gravel; neutral; clear smooth boundary.

Bw2—10 to 14 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 15 percent cobbles; 30 percent gravel; neutral; clear wavy boundary.

2C—14 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; many very fine and fine roots; few fine interstitial pores; 40 percent cobbles; 35 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the 2C horizon:* 10 to 20 inches

*A horizon*
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 to 3
- Clay content: 10 to 25 percent
- Content of rock fragments: 10 to 50 percent—5 to 35 percent cobbles; 5 to 15 percent gravel
- Reaction: pH 6.6 to 7.3

*Bw horizons*
- Hue: 10YR or 7.5YR
- Value: 3 to 6 dry; 2 to 4 moist
- Chroma: 2 to 4
- Texture: Loam, sandy clay loam, or sandy loam
- Clay content: 10 to 25 percent
- Content of rock fragments: 10 to 60 percent—5 to 30 percent cobbles; 5 to 30 percent gravel
- Reaction: pH 6.6 to 7.8

*2C horizon*
- Hue: 10YR or 7.5YR
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 to 4

Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 90 percent—25 to 50 percent stones and cobbles; 35 to 40 percent gravel
Reaction: pH 6.6 to 7.8

## *Beaverell Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 35 percent
*Elevation range:* 3,600 to 6,400 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Loamy-skeletal over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Argiustolls

### Typical Pedon

Beaverell cobbly loam, 0 to 4 percent slopes, in an area of rangeland, 2,000 feet south and 1,200 feet east of the northwest corner of sec. 10, T. 7 N., R. 10 W.; Powell County, Montana.

A—0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark brown (10YR 2/2) moist; weak medium platy structure parting to moderate medium granular; soft, friable, nonsticky, nonplastic; many very fine and fine roots; common very fine discontinuous vesicular pores; 10 percent cobbles; 15 percent gravel; slightly acid; clear wavy boundary.

Bt1—5 to 12 inches; brown (7.5YR 5/4) very cobbly loam, brown (7.5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; few very fine discontinuous tubular pores; few faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; neutral; gradual wavy boundary.

Bt2—12 to 16 inches; yellowish brown (10YR 5/6) very cobbly loam, dark yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; few very fine discontinuous tubular pores; common faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; neutral; clear wavy boundary.

2Bk1—16 to 31 inches; white (10YR 8/2) extremely gravelly loamy sand, light brownish gray (10YR 6/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine roots; 25 percent cobbles; 40 percent gravel; disseminated lime; continuous distinct lime casts coating coarse fragments; violently effervescent; slightly alkaline; gradual wavy boundary.

2Bk2—31 to 60 inches; reddish yellow (5YR 6/6) extremely gravelly loamy sand, yellowish red (5YR 5/6) moist; single grain; loose, nonsticky, nonplastic; 20 percent cobbles; 45 percent gravel; disseminated lime; continuous distinct lime casts coating coarse fragments; strongly effervescent; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 40 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches; dry in some part less than five-tenths and dry in some part more than six-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher
*Thickness of the mollic epipedon:* 7 to 14 inches
*Depth to the Bk horizon:* 10 to 20 inches

*A horizon*
Value: 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 10 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent gravel
Reaction: pH 6.6 to 7.8

*Bt1 horizon*
Hue: 10YR or 7.5YR
Value: 3 to 5 dry; 2 to 4 moist
Chroma: 2 to 4
Texture: Clay loam, sandy clay loam, or loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent gravel
Reaction: pH 6.6 to 7.8

*Bt2 horizon*
Hue: 10YR, 7.5Y, or 2.5Y
Value: 3 to 5 dry; 2 to 4 moist
Chroma: 2 to 4 or 6
Texture: Clay loam, sandy clay loam, or loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent gravel
Reaction: pH 6.6 to 7.8

*2Bk1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loamy sand, sand, or sandy loam
Clay content: 0 to 15 percent
Content of rock fragments: 35 to 75 percent—5 to 30 percent cobbles; 30 to 45 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

*2Bk2 horizon*
Hue: 10YR, 5YR, or 2.5Y
Value: 4 to 6 dry; 4 to 6 moist
Chroma: 2 to 4 or 6
Texture: Loamy sand or sand
Clay content: 0 to 5 percent
Content of rock fragments: 35 to 80 percent—5 to 30 percent stones and cobbles; 30 to 60 percent gravel

Calcium carbonate equivalent: 2 to 10 percent
Reaction: pH 6.6 to 8.4

## *Bendoh Series*

*Depth class:* Deep (40 to 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountainsides
*Parent material:* Colluvium and alluvium over residuum from rhyolite
*Slope range:* 2 to 70 percent
*Elevation range:* 5,400 to 7,800 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy, glassy Vitrandic Eutrocryepts

### Typical Pedon

Bendoh very gravelly ashy loam, in an area of Bendoh-Karloff-Eremis complex, 15 to 35 percent slopes, moderately impacted, in an area of forestland, 2,000 feet south and 2,400 feet west of the northeast corner of sec. 16, T. 3 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.

A—1 to 3 inches; dark grayish brown (10YR 4/2) very gravelly ashy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, very friable, slightly sticky, nonplastic; 5 percent cobbles; 35 percent gravel; strongly acid; clear smooth boundary.

E—3 to 7 inches; grayish brown (10YR 5/2) gravelly ashy loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine and fine tubular pores; 5 percent cobbles; 15 percent gravel; moderately acid; clear wavy boundary.

Bw—7 to 15 inches; light brownish gray (10YR 6/2) gravelly ashy sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 5 percent cobbles; 15 percent gravel; moderately acid; gradual wavy boundary.

BC—15 to 29 inches; light gray (2.5Y 7/2) gravelly ashy sandy clay loam, olive gray (5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 10 percent cobbles; 20 percent gravel; moderately acid; gradual irregular boundary.

C1—29 to 43 inches; light gray (2.5Y 7/2) very gravelly ashy sandy clay loam, olive gray (5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine tubular pores; 10 percent cobbles; 25 percent gravel; slightly acid; gradual irregular boundary.

C2—43 to 51 inches; light gray (5Y 7/2) very gravelly ashy sandy clay loam, olive gray (5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; 15 percent cobbles; 40 percent gravel; slightly acid; gradual wavy boundary.

Cr—51 to 56 inches; light gray (5Y 7/2) decomposing welded tuff bedrock that crushes to gravelly or very gravelly ashy sandy clay loam; slightly acid.

R—56 inches; light gray (5Y 7/2) fractured welded tuff bedrock.

## Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Depth to the Cr horizon:* 40 to 55 inches
*Depth to bedrock:* 55 to 60 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 3 to 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 45 percent—0 to 10 percent stones and cobbles; 15 to 35 percent gravel
Reaction: pH 5.1 to 6.5

*E horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 15 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 15 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 6.5

*Bw horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*BC and C1 horizons*
Hue: 2.5Y or 5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 or 2
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*C2 horizon*
Hue: 2.5Y or 5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 1 or 2
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 15 to 25 percent
Content of rock fragments: 15 to 60 percent—0 to 15 percent stones and cobbles; 15 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Bignell Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Mountains and moraines
*Parent material:* Colluvium from fine-grained extrusive igneous rocks and glacial till
*Slope range:* 8 to 60 percent
*Elevation range:* 4,000 to 7,400 feet
*Annual precipitation:* 18 to 30 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive, frigid Typic Haplustalfs

### Typical Pedon

Bignell gravelly clay loam, 15 to 35 percent slopes, in an area of woodland, 1,400 feet west and 2,100 feet south of the northeast corner of sec. 24, T. 10 N., R. 9 W.; Powell County, Montana.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.

E—2 to 15 inches; light brownish gray (10YR 6/2) gravelly clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; common medium and many very fine and fine roots; common very fine and fine tubular pores; 5 percent cobbles; 20 percent gravel; moderately acid; clear wavy boundary.

E/Bt—15 to 19 inches; E part (75 percent) is pinkish gray (7.5YR 6/2) very gravelly clay loam, brown (7.5YR 5/3) moist; B part (25 percent) is brown (7.5YR 5/2) very gravelly clay loam, dark brown (7.5YR 3/4) moist; common distinct clay films on faces of peds; moderate medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, firm, slightly sticky, moderately plastic; common medium and many very fine and fine roots; common very fine and fine tubular pores; 5 percent cobbles; 40 percent gravel; slightly acid; clear wavy boundary.

Bt1—19 to 27 inches; brown (7.5YR 5/4) very gravelly clay, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few fine and common very fine roots; few very fine and fine tubular pores; common distinct clay films on faces of peds; 15 percent cobbles; 40 percent gravel; slightly acid; clear wavy boundary.

Bt2—27 to 60 inches; brown (7.5YR 5/4) very gravelly clay loam; dark brown (7.5YR 4/4) moist; strong fine subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine and fine tubular pores; common distinct clay films on faces of peds; 15 percent cobbles; 45 percent gravel; moderately acid.

### Range in Characteristics

*Soil temperature:* 40 to 44 degrees F
*Moisture control section:* Between 4 and 12 inches

*E horizon*
- Hue: 10YR or 7.5YR
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 2 to 4
- Texture: Loam or clay loam
- Clay content: 10 to 30 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 7.3

*E/Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 5 to 7 dry; 5 or 6 moist; B part: 5 to 7 dry
Chroma: E part: 1 to 3; B part: 2 to 4 or 6
Texture: Loam or clay loam
Clay content: 10 to 35 percent
Content of rock fragments: 35 to 55 percent—0 to 5 percent cobbles; 35 to 50 percent gravel
Reaction: pH 5.1 to 7.3

*Bt horizons*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 35 to 60 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent gravel
Reaction: pH 5.1 to 7.3

## *Blossberg Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour) to the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains, depressions, drainageways, and alluvial fans
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,600 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Endoaquolls

### Typical Pedon

Blossberg loam, 0 to 4 percent slopes, in an area of pasture, 2,400 feet south and 200 feet west of the northeast corner of sec. 6, T. 6 N., R. 9 W.; Powell County, Montana.

A—0 to 14 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; many large prominent yellowish brown (10YR 5/6) redox concentrations; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; neutral; clear smooth boundary.

Bg1—14 to 23 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown (2.5Y 5/2) dry; many large prominent yellowish brown (10YR 5/8) redox concentrations; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, moderately plastic; many very fine roots; many very fine and fine irregular pores; 5 percent cobbles; slightly alkaline; gradual smooth boundary.

Bg2—23 to 28 inches; grayish brown (2.5Y 5/2) gravelly loam, light brownish gray (2.5Y 6/2) dry; few fine prominent red (2.5YR 5/8) redox concentrations; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine irregular pores; 5 percent cobbles; 20 percent gravel; slightly alkaline; gradual wavy boundary.

2Cg—28 to 60 inches; dark grayish brown (10YR 4/2) very cobbly loamy coarse sand; light brownish gray (10YR 6/2) dry; common large prominent red (2.5YR 5/8) redox concentrations; single grain; loose, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 35 percent cobbles; 20 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 24 inches
*Depth to the 2Cg horizon:* 20 to 40 inches
*Depth to the seasonal high water table:* 12 to 24 inches

*A horizon*
Value: 2 or 3 moist; 3 to 5 dry
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 6.6 to 7.8

*Bg1 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 3 or 4 moist; 3 to 6 dry
Chroma: 2 or 3
Texture: Clay loam, loam, or silty clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 15 percent
Reaction: pH 7.4 to 8.4

*Bg2 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5 moist; 5 or 6 dry
Chroma: 1 or 2
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 20 to 40 percent—5 to 15 percent cobbles; 15 to 25 percent gravel
Calcium carbonate equivalent: 0 to 15 percent
Reaction: pH 7.4 to 8.4

*2Cg horizon*
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 2 to 4
Texture: Coarse sand, loamy coarse sand, or sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent—25 to 35 percent cobbles; 15 to 25 percent gravel

Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 7.4 to 8.4

## *Braziel Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Hills and mountains
*Parent material:* Colluvium from fine-grained extrusive igneous rock
*Slope range:* 2 to 60 percent
*Elevation range:* 3,800 to 6,900 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Pachic Argiustolls

### Typical Pedon

Braziel gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 1,200 feet south and 1,450 feet east of the northwest corner of sec. 21, T. 7 N., R. 10 W.; Powell County, Montana.

A1—0 to 5 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/3) moist; strong fine granular structure; soft, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 10 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

A2—5 to 8 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, moderately plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 10 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

Bt1—8 to 29 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; few faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; neutral; gradual smooth boundary.

Bt2—29 to 43 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine and fine roots; many very fine and fine tubular pores; common faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; neutral; clear smooth boundary.

BC—43 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; 10 percent cobbles; 40 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 16 to 30 inches

*A1 horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3 dry; 1 to 3 moist

Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—5 to 15 percent stones and cobbles; 10 to 20 percent gravel
Reaction: pH 6.6 to 7.3

*A2 horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3 dry; 1 to 3 moist
Texture: Clay loam or loam
Clay content: 20 to 35 percent
Content of rock fragments: 5 to 60 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
Reaction: pH 6.6 to 7.3

*Bt horizons*
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Clay loam or loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 75 percent—10 to 35 percent cobbles; 25 to 40 percent gravel
Reaction: pH 6.6 to 7.3

*BC horizon*
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 3 or 4 dry; 2 to 4 moist
Texture: Clay loam, loam, sandy loam, or sandy clay loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 70 percent—10 to 35 percent cobbles; 25 to 40 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 6.6 to 7.8

## *Bridger Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 4,800 to 7,000 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Ustic Argicryolls

### Typical Pedon

Bridger cobbly loam, 8 to 15 percent slopes, in an area of rangeland, 2,500 feet south and 400 feet west of the northeast corner of sec. 27, T. 2 N., R. 13 W.

A—0 to 9 inches; dark gray (10YR 4/1) cobbly loam, very dark gray (10YR 3/1) moist; strong fine granular structure; soft, very friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few fine tubular pores; 10 percent cobbles; 10 percent gravel; slightly acid; clear smooth boundary.

Bt1—9 to 13 inches; grayish brown (10YR 5/2) gravelly clay, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; hard, very friable, moderately sticky, moderately plastic; few medium and many very fine and fine roots; common very fine tubular pores; common distinct clay films on faces of peds; 5 percent cobbles; 15 percent gravel; slightly acid; clear wavy boundary.

Bt2—13 to 28 inches; yellowish brown (10YR 5/4) gravelly clay, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse prismatic structure parting to strong fine and medium angular blocky; very hard, very firm, very sticky, very plastic; few medium and many very fine and fine roots; few very fine tubular pores; continuous distinct grayish brown (10YR 5/3) clay films on faces of peds; 15 percent gravel; neutral; clear wavy boundary.

Bt3—28 to 36 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong fine and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; few very fine tubular pores; many distinct grayish brown (10YR 5/3) clay films on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

Btk—36 to 43 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine tubular pores; common distinct grayish brown (10YR 5/3) clay films on faces of peds; common fine and few medium soft masses of white (10YR 8/1) lime; 5 percent gravel; slightly alkaline; gradual wavy boundary.

Bk—43 to 60 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine tubular pores; many fine and few medium soft masses of white (10YR 8/1) lime; many medium white (10YR 8/1) lime coats on gravel; violently effervescent; 10 percent gravel; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 40 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 14 inches

*A horizon*
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
- Reaction: pH 6.1 to 7.8

*Bt horizons*
- Value: 5 or 6 dry; 3 or 4 moist
- Chroma: 2 to 4
- Texture: Clay, silty clay, or clay loam
- Clay content: 35 to 50 percent
- Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel; Reaction: pH 6.1 to 7.8

*Btk horizon*
- Value: 5 or 6 dry; 3 or 4 moist
- Chroma: 2 to 4
- Texture: Clay loam or loam
- Clay content: 20 to 40 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

*Bk horizon*
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture: Clay loam or loam
Clay content: 18 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

## *Burrfoot Series*

*Depth class:* Deep (40 to 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Footslopes and side slopes of hills
*Parent material:* Colluvium and residuum from rhyolite
*Slope range:* 15 to 35 percent
*Elevation range:* 5,100 to 6,200 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy-skeletal, glassy, frigid Vitrandic Haplustolls

### Typical Pedon

Burrfoot gravelly ashy sandy clay loam, in an area of Burrfoot-Nivean complex, 15 to 35 percent slopes, moderately impacted, in an area of rangeland, 400 feet east and 1,300 feet north of the southwest corner of sec. 18, T. 5 N., R. 10 W.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly ashy sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, soft, slightly sticky, slightly plastic; common fine and medium and many very fine roots; 5 percent angular cobbles; 15 percent gravel; neutral; clear wavy boundary.

A2—5 to 12 inches; brown (10YR 4/3) very gravelly ashy sandy clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky, moderately plastic; common fine and medium and many very fine roots; few fine and common very fine tubular pores; 15 percent angular cobbles; 30 percent gravel; neutral; clear wavy boundary.

Bw1—12 to 20 inches; light olive brown (2.5Y 5/4) very gravelly ashy coarse sandy loam, olive brown (2.5Y 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few fine and medium and many very fine roots; common very fine tubular pores; 15 percent angular cobbles; 35 percent gravel; neutral; gradual wavy boundary.

Bw2—20 to 29 inches; light yellowish brown (2.5Y 6/4) very gravelly ashy coarse sandy loam, dark yellowish brown (10YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few fine and common very fine roots; common very fine tubular pores; 15 percent angular cobbles; 35 percent gravel; neutral; gradual wavy boundary.

BC—29 to 48 inches; light gray (2.5Y 7/1) ashy sandy loam, light yellowish brown (2.5Y 6/3) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; few very fine roots; common very fine tubular pores; slightly effervescent in lower portion; 10 percent gravel; slightly alkaline; gradual wavy boundary.

Cr—48 to 60 inches; light gray (10YR 7/2) semiconsolidated welded tuff bedrock that crushes to very gravelly coarse sandy loam; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 8 and 24 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Thickness of the mollic epipedon:* 8 to 15 inches
*Depth to the Cr horizon:* 40 to 60 inches

*A horizons*
- Hue: 10YR or 2.5Y
- Value: 3 or 4 dry; 2 or 3 moist
- Chroma: 1 to 3
- Clay content: 20 to 32 percent
- Content of rock fragments: 15 to 60 percent—0 to 20 percent stones and cobbles; 15 to 40 percent gravel
- Reaction: pH 6.1 to 7.3

*Bw horizons*
- Hue: 10YR or 2.5Y
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 3, 4, or 6
- Texture: Ashy coarse sandy loam, ashy sandy loam, or ashy sandy clay loam
- Clay content: 10 to 24 percent
- Content of rock fragments: 35 to 60 percent—15 to 20 percent stones and cobbles; 20 to 40 percent gravel
- Reaction: pH 6.1 to 7.3

*BC horizon*
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4 to 6 moist
- Chroma: 1 to 3
- Texture: Ashy sandy loam, ashy coarse sandy loam, or ashy loamy coarse sand
- Clay content: 5 to 18 percent
- Content of rock fragments: 10 to 60 percent—0 to 20 percent stones and cobbles; 10 to 40 percent gravel
- Calcium carbonate equivalent: 0 to 5 percent
- Reaction: pH 7.4 to 8.4

## *Bushong Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Stream terraces, outwash plains, and flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,600 to 5,800 feet

*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Aeric Endoaquents

## Typical Pedon

Bushong loam, 0 to 4 percent slopes, in an area of pasture, 500 feet east and 100 feet north of the southwest corner of sec. 6, T. 6 N., R. 9 W.; Powell County, Montana.

Oi—0 to 1 inch; partially decomposed organic matter.

A—1 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common very fine and fine discontinuous irregular pores; 5 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—3 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; few fine faint dark yellowish brown (10YR 4/4) redox concentrations; moderate fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine and fine discontinuous irregular pores; 5 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—5 to 16 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; many fine distinct brown (7.5YR 4/4) redox concentrations; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine and fine discontinuous irregular pores; 10 percent cobbles; 20 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—16 to 60 inches; pale brown (10YR 6/3) very cobbly sand; brown (10YR 5/3) moist; many medium distinct brown (10YR 4/4) redox concentrations; single grain; loose, nonsticky, nonplastic; few medium and common very fine and fine roots; common very fine and fine discontinuous irregular pores; 30 percent cobbles; 25 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the Bk horizon:* 3 to 8 inches
*Depth to the seasonal high water table:* 12 to 24 inches

*A horizon*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 2 or 3 moist; 4 or 5 dry
- Chroma: 1 or 2
- Clay content: 15 to 25 percent
- Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent gravel
- Calcium carbonate equivalent: 0 to 5 percent
- Reaction: pH 7.4 to 8.4

*Bw horizon*
Hue: 10YR or 2.5Y
Value: 3 or 4 moist; 4 or 5 dry
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 15 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 7.4 to 8.4

*Bk horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 moist; 5 or 6 dry
Chroma: 3 or 4
Texture: Loam, clay loam, or sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent gravel
Calcium carbonate equivalent: 3 to 15 percent
Reaction: pH 7.4 to 8.4

*2C horizon*
Value: 4 to 6 moist; 6 or 7 dry
Chroma: 2 or 3
Clay content: 2 to 6 percent
Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 25 to 55 percent gravel
Reaction: pH 6.6 to 7.8

## *Caramon Series*

*Depth class:* Deep (40 to 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Hills and mountains
*Parent material:* Colluvium and residuum from rhyolite
*Slope range:* 8 to 60 percent
*Elevation range:* 5,200 to 6,400 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy, glassy, frigid Vitrandic Haplustalfs

### Typical Pedon

Caramon ashy loam, 15 to 35 percent slopes, moderately impacted, in an area of woodland, 1,100 feet west and 50 feet south of the northeast corner of sec. 14, T. 4 N., R. 11 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) ashy loam, black (10YR 2/1) (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable, moderately sticky, moderately plastic; common fine and many very fine, medium, and coarse roots; 10 percent gravel; slightly acid; abrupt smooth boundary.

E—4 to 9 inches; light brownish gray (10YR 6/2) gravelly ashy clay loam, brown (10YR 4/3) moist; weak fine granular structure; slightly hard, very friable, moderately sticky, moderately plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; 20 percent gravel; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; light olive brown (2.5Y 5/3) ashy clay, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; very hard, firm, moderately sticky, very plastic; common very fine, fine, medium, and coarse roots; few very fine, fine, and medium tubular pores; common faint clay films on faces of peds; 10 percent gravel; neutral; clear smooth boundary.

Bt2—18 to 30 inches; light brownish gray (10YR 6/2) ashy clay, dark grayish brown (10YR 4/2) moist; weak fine prismatic structure parting to weak fine subangular blocky; very hard, firm, moderately sticky, very plastic; few fine and medium and common very fine roots; few very fine and fine tubular pores; few faint clay films on faces of peds; 30 percent soft to semi-hard gravel-size fragments; neutral; gradual smooth boundary.

BC—30 to 46 inches; light gray (10YR 7/1)) ashy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; 15 percent soft to semi-hard gravel-size fragments; neutral.

R—46 inches; light gray (10YR 7/2) hard volcanic tuff bedrock.

## Range in Characteristics

*Soil temperature:* 40 to 44 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the argillic horizon:* 5 to 12 inches
*Depth to bedrock:* 40 to 60 inches

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel
- Reaction: pH 5.6 to 6.5

*E horizon*
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 3 to 5 moist
- Chroma: 2 or 3
- Texture: Ashy loam or ashy clay loam
- Clay content: 20 to 35 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent stones and cobbles; 5 to 30 percent gravel
- Reaction: pH 6.1 to 7.3

*Bt horizons*
- Hue: 10YR or 2.5Y
- Value: 5 to 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Ashy clay loam or ashy clay
- Clay content: 35 to 50 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones and cobbles; 5 to 30 percent gravel
Reaction: pH 6.1 to 7.3

*BC horizon*
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Ashy loam, ashy clay loam, or ashy sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel
Reaction: pH 6.6 to 7.8

## *Carten Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour) above the 2C horizon, rapid (6 to 20 inches/hour) in the 2C horizon
*Landform:* Outwash plains, outwash fans, flood plains, and stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,600 to 6,000 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Oxyaquic Haplustolls

### Typical Pedon

Carten loam, 0 to 4 percent slopes, in an area of irrigated hay, 2,950 feet north and 1,900 feet west of the southeast corner of sec. 30, T. 6 N., R. 9 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine discontinuous irregular pores; 5 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—7 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine discontinuous irregular pores; 5 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—9 to 13 inches; light gray (10YR 7/2) gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; common very fine irregular pores; 25 percent gravel; disseminated lime; common distinct lime casts on gravel; violently effervescent; slightly alkaline; gradual wavy boundary.

BC—13 to 16 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine irregular pores; 5 percent cobbles; 35 percent gravel; strongly effervescent; slightly alkaline; clear smooth boundary.

2C—16 to 60 inches; very pale brown (10YR 7/3) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; few fine distinct brownish yellow (10YR 6/8) redox concentrations; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many fine irregular pores; 15 percent cobbles; 35 percent gravel; strongly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the seasonal high water table:* 24 to 42 inches
*Depth to the Bk horizon:* 9 to 13 inches
*Depth to the 2C horizon:* 12 to 20 inches

*Ap horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bw horizon*
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 0 to 30 percent gravel
Reaction: pH 7.4 to 8.4

*Bk horizon*
Value: 5 to 8 dry; 4 to 6 moist
Chroma 2 to 4
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

*BC horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 8 to 18 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent gravel
Reaction: pH 7.4 to 8.4

*2C horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loamy sand or sand
Clay content: 2 to 10 percent
Content of rock fragments: 40 to 80 percent—10 to 25 percent cobbles; 30 to 55 percent gravel
Reaction: pH 7.4 to 8.4

## *Caseypeak Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Residuum from granite
*Slope range:* 35 to 60 percent
*Elevation range:* 6,400 to 7,000 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lithic Eutrocryepts

### Typical Pedon

Caseypeak gravelly coarse sandy loam, in an area of Caseypeak, very bouldery-Franconi, very bouldery-Rock outcrop complex, 25 to 60 percent slopes, in an area of forestland, 1,550 feet north and 1,100 feet west of the southeast corner of sec. 19, T. 4 N., R. 3 W.; Jefferson County, Montana.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.

E—1 to 6 inches; light brownish gray (10YR 6/2) gravelly coarse sandy loam, brown (10YR 5/3) moist; moderate medium granular structure; slightly hard, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; few medium and many very fine and fine tubular pores; 20 percent gravel; slightly acid; clear wavy boundary.

Bw1—6 to 12 inches; brown (10YR 5/3) very gravelly coarse sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; few fine and many very fine tubular and interstitial pores; 40 percent gravel; neutral; gradual wavy boundary.

Bw2—12 to 17 inches; pale brown (10YR 6/3) very gravelly coarse sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few medium, common fine, and many very fine roots; few fine and many very fine tubular and interstitial pores; 40 percent gravel; neutral; clear wavy boundary.

Cr—17 to 19 inches; light yellowish brown (2.5Y 6/4) decomposing granite bedrock (grus) that crushes to very gravelly loamy coarse sand; neutral.

R—19 inches; hard granite bedrock.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches or to the lithic contact when bedrock is less than 12 inches
*Base saturation:* Greater than 60 percent throughout
*Depth to the Cr horizon:* 10 to 18 inches
*Depth to bedrock:* 12 to 20 inches
*Surface fragments:* 0 to 3 percent boulders

*E horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent

Content of rock fragments: 10 to 35 percent—0 to 15 percent stones and cobbles; 10 to 20 percent gravel
Reaction: pH 5.6 to 6.5

*Bw1 horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Coarse sandy loam, sandy loam, or sandy clay loam
Clay content: 10 to 22 percent
Content of rock fragments: 35 to 60 percent gravel (mainly less than 7 mm in diameter)
Reaction: pH 6.1 to 7.3

*Bw2 horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Coarse sandy loam, sandy loam, or sandy clay loam
Clay content: 10 to 22 percent
Content of rock fragments: 35 to 60 percent gravel (mainly less than 10 mm in diameter)
Reaction: pH 6.1 to 7.3

## *Cetrack Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Alluvial fans, stream terraces, and outwash plains
*Parent material:* Alluvium
*Slope range:* 0 to 15 percent
*Elevation range:* 3,800 to 5,600 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Haplustolls

### Typical Pedon

Cetrack loam, 0 to 4 percent slopes, in an area of irrigated cropland, 950 feet south and 1,100 feet west of the northeast corner of sec. 20, T. 7 N., R. 9 W.; Powell County, Montana.

Ap—0 to 6 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate thick platy structure; slightly hard, very friable, moderately sticky, slightly plastic; many very fine, fine, and medium roots; few medium tubular pores; neutral; abrupt smooth boundary.

Bw—6 to 11 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; slightly alkaline; clear wavy boundary.

Bk1—11 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 5 percent gravel; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—16 to 26 inches; very pale brown (10YR 8/3) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine irregular pores; 5 percent gravel; disseminated lime, few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—26 to 30 inches; very pale brown (10YR 7/3) sandy loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine, fine, and medium roots; 10 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

2C—30 to 60 inches; very pale brown (10YR 7/3) very gravelly loamy sand; pale brown (10YR 6/3) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; 35 percent gravel; few faint lime casts on undersides of coarse fragments; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 42 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 14 inches
*Depth to the Bk horizon:* 8 to 14 inches
*Depth to the 2C horizon:* 20 to 40 inches

*Ap horizon*
Chroma: 2 or 3
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 6.1 to 7.3

*Bw horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 22 to 32 percent
Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bk1 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 22 to 32 percent
Content of rock fragments: 5 to 20 percent—0 to 5 percent cobbles; 5 to 15 percent gravel
Calcium carbonate equivalent: 5 to 20 percent
Reaction: pH 7.4 to 8.4

*Bk2 horizon*
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 18 to 25 percent
Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

*Bk3 horizon*
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Sandy loam or loam
Clay content: 18 to 25 percent
Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

*2C horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 70 percent—0 to 20 percent cobbles; 35 to 50 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

## *Clasoil Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains, alluvial fans, and stream terraces
*Parent material:* Alluvium and colluvium from granite
*Slope range:* 4 to 60 percent
*Elevation range:* 3,500 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Clasoil sandy loam, 4 to 8 percent slopes, in an area of rangeland, 1,300 feet south and 200 feet west of the northeast corner of sec. 34, T. 4 N., R. 10 W.

A—0 to 4 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; 10 percent gravel; strongly acid; clear smooth boundary.

Bt1—4 to 7 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common distinct clay films bridging sand grains; 10 percent gravel; moderately acid; clear smooth boundary.

Bt2—7 to 12 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common distinct clay films bridging sand grains; 30 percent gravel; neutral; clear smooth boundary.

BC—12 to 31 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine roots; 30 percent gravel; neutral; clear smooth boundary.

C—31 to 60 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; 30 percent gravel; slightly acid.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches

*A horizon*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 12 to 20 percent
Content of rock fragments: 5 to 15 percent gravel
Reaction: pH 5.1 to 7.3

*Bt horizons*
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Sandy clay loam or loam
Clay content: 18 to 30 percent
Content of rock fragments: 10 to 35 percent gravel
Reaction: pH 5.6 to 7.3

*BC horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Sandy loam or coarse sandy loam
Clay content: 12 to 20 percent
Content of rock fragments: 15 to 40 percent gravel
Reaction: pH 6.1 to 7.8

*C horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Sandy loam, coarse sandy loam, or loamy coarse sand
Clay content: 12 to 20 percent
Content of rock fragments: 10 to 40 percent gravel
Reaction: pH 6.1 to 7.8

## *Comad Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Excessively drained
*Permeability:* Rapid (6 to 20 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium from granite
*Slope range:* 8 to 80 percent
*Elevation range:* 6,300 to 9,200 feet
*Annual precipitation:* 20 to 35 inches
*Annual air temperature:* 34 to 41 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Sandy-skeletal, mixed Lamellic Cryorthents

### Typical Pedon

Comad very stony sandy loam, in an area of Comad-Elkner complex, 35 to 60 percent slopes, in an area of woodland, 2,800 feet south and 1,650 feet east of the northwest corner of sec. 29, T. 11 N., R. 7 W.; Powell County, Montana.

Oi—0 to 1 inch; partially decomposed forest litter.

E1—1 to 5 inches; light brownish gray (10YR 6/2) very stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; few fine and medium roots; few medium discontinuous irregular pores; 30 percent stones; 15 percent cobbles; 10 percent gravel; moderately acid; clear wavy boundary.

E2—5 to 18 inches; light brownish gray (10YR 6/2) very stony loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few medium roots; few medium discontinuous irregular pores; 25 percent stones; 20 percent cobbles; 10 percent gravel; moderately acid; gradual wavy boundary.

E and Bt—18 to 43 inches; E part (80 percent) is light brownish gray (10YR 6/2) extremely stony loamy sand, grayish brown (10YR 5/2) moist; B part (20 percent) is brownish yellow (10YR 6/6) sandy clay loam lamellae 1/4- to 1/2-inch thick, yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few medium discontinuous irregular pores; 25 percent stones; 15 percent cobbles; 20 percent gravel; slightly acid; diffuse wavy boundary.

C—43 to 60 inches; light brownish gray (10YR 6/2) extremely stony loamy sand; dark grayish brown (10YR 4/2) moist; massive; loose, nonsticky, nonplastic; few very fine roots; 25 percent stones; 15 percent cobbles; 20 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 37 to 40 degrees F
*Moisture control section:* Between 12 and 35 inches
*Depth to lamellae:* 13 to 20 inches

*E horizons*

Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Texture: Sandy loam or loamy sand
Content of rock fragments: 35 to 70 percent—10 to 35 percent stones; 15 to 25 percent cobbles; 10 to 15 percent gravel
Reaction: pH 5.1 to 7.3

*E and Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry; 4 to 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4 or 6
Clay content: 0 to 10 percent
Content of rock fragments: 50 to 80 percent—15 to 35 percent stones; 15 to 25 percent cobbles; 10 to 20 percent gravel
Reaction: pH 5.1 to 7.3

*C horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 50 to 80 percent—25 to 35 percent stones; 15 to 25 percent cobbles; 10 to 20 percent gravel
Reaction: pH 5.1 to 7.3

## *Con Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Calcareous alluvium
*Slope range:* 0 to 60 percent
*Elevation range:* 4,000 to 5,800 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aridic Haplustolls

### Typical Pedon

Con loam, 0 to 4 percent slopes, in an area of cropland, 300 feet north and 600 feet east of the southwest corner of sec. 24, T. 7 N., R. 10 W.

Ap—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium granular structure; soft; friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent gravel; neutral; clear smooth boundary.

Bw—7 to 11 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; common very fine and fine roots; many fine irregular pores; 5 percent gravel; slightly alkaline; clear smooth boundary.

Bk1—11 to 21 inches; white (10YR 8/2) loam, very pale brown (10YR 7/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; many fine irregular pores; continuous distinct lime coats and casts on surface of gravel; common fine masses of lime; violently effervescent; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bk2—21 to 34 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, nonplastic; few very fine and fine roots; common fine irregular pores; 5 percent gravel; continuous distinct lime casts and coats on surface of gravel; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—34 to 60 inches; very pale brown (10YR 7/3) gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; few very fine and fine roots; common fine irregular pores; 15 percent gravel; continuous distinct lime casts and coats on surface of gravel; common fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches; dry in some part for six-tenths or more of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher
*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the calcic horizon:* 11 to 18 inches

*Ap horizon*
Chroma: 1 to 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 60 percent—0 to 20 percent cobbles; 0 to 55 percent gravel
Reaction: pH 4.5 to 7.3

*Bw horizon*
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bk1 horizon*
Value: 7 or 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 3 or 4
Texture: Sandy loam, clay loam, or loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel
Calcium carbonate equivalent: 15 to 25 percent
Reaction: pH 7.9 to 8.4

*Bk3 horizon*
Value: 5 to 8 dry; 4 or 6 moist
Chroma: 3 or 4
Texture: Sandy loam or loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 15 to 25 percent
Reaction: pH 7.9 to 8.4

## *Copenhaver Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Hills
*Parent material:* Residuum from argillite, quartzite, andesite, and basalt
*Slope range:* 8 to 60 percent
*Elevation range:* 5,300 to 8,200 feet
*Annual precipitation:* 14 to 25 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lithic Argicryolls

### Typical Pedon

Copenhaver gravelly loam, in an area of Libeg-Copenhaver–Rock outcrop complex, 8 to 15 percent slopes, in an area of rangeland, 1,700 feet west and 1,320 feet north of the southeast corner of sec. 17, T. 7 N., R. 14 W.; Granite County, Montana.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; common very fine interstitial pores; 30 percent gravel; neutral; clear smooth boundary.

Bt—6 to 12 inches; pinkish gray (7.5YR 6/2) very gravelly clay loam, brown (7.5YR 4/2) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine roots; common very fine interstitial pores; few faint clay films on faces of peds; 5 percent cobbles; 45 percent gravel; slightly alkaline.

R—12 inches; argillite bedrock.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches or to the lithic contact if less than 12 inches
*Thickness of the mollic epipedon:* 7 to 16 inches
*Depth to bedrock:* 10 to 20 inches
*Surface fragments:* 0 to 0.1 percent stones

*A horizon*
Hue: 10YR, 7.5YR, or 5YR
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 0 to 20 percent cobbles; 15 to 40 percent gravel
Reaction: pH 6.1 to 7.3

*Bt horizon*
Hue: 10YR, 7.5YR, or 5YR
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 to 4 or 6

Texture: Loam or clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 75 percent—5 to 15 percent cobbles; 30 to 60 percent gravel
Reaction: pH 6.1 to 7.8

## *Coslaw Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium over residuum from rhyolite
*Slope range:* 15 to 60 percent
*Elevation range:* 5,400 to 7,800 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy-skeletal, glassy, shallow Vitrandic Eutrocryepts

### Typical Pedon

Coslaw gravelly ashy sandy loam, in an area of Coslaw-Rock outcrop association, 15 to 60 percent slopes, severely impacted, in an area of nonstocked forest, 2,250 feet east and 1,500 feet south of the northwest corner of sec. 16, T. 3 N., R. 11 W.

A—0 to 4 inches; grayish brown (2.5Y 5/2) gravelly ashy sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; few very fine and fine roots; 25 percent gravel; strongly acid; clear wavy boundary.

Bw—4 to 18 inches; light brownish gray (2.5Y 6/2) very gravelly ashy sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine tubular pores; 10 percent cobbles; 40 percent gravel; neutral; gradual wavy boundary.

Cr—18 to 31 inches; light gray (5Y 7/2) decomposing welded tuff bedrock that crushes to very gravelly ashy sandy loam; neutral.

R—31 inches; white (5Y 8/1) fractured hard welded tuff bedrock.

### Range in Characteristics

*Mean annual soil temperature:* 32 to 39 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 8 and 18 inches or between 8 inches and the paralithic contact
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the Cr horizon:* 12 to 18 inches
*Depth to bedrock:* 24 to 40 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 1 or 2
Texture: Ashy loam or ashy sandy loam

Clay content: 10 to 20 percent
Content of rock fragments: 15 to 50 percent—0 to 15 percent stones and cobbles or flagstones; 10 to 40 percent gravel
Reaction: pH 5.1 to 6.5

*Bw horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 1 or 2
Texture: Ashy loam, ashy sandy clay loam, ashy coarse sandy loam, or ashy sandy loam
Clay content: 10 to 22 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent stones and cobbles; 30 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Cowood Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium and residuum from granite
*Slope range:* 35 to 80 percent
*Elevation range:* 6,200 to 9,200 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lithic Eutrocryepts

### Typical Pedon

Cowood very channery loam, in an area of Shadow-Cowood complex, 25 to 60 percent slopes, in an area of forestland, 2,650 feet north and 1,700 feet east of the southwest corner of sec. 29, T. 14 N., R. 5 W.; Lewis and Clark County, Montana.

Oi—0 to 1 inch; root mat and forest litter of needles and twigs.
E—1 to 5 inches; brown (10YR 5/3) very channery loam, dark brown (10YR 4/3) moist; moderate very thin platy structure; slightly hard, very friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine tubular and interstitial pores; many silt and sand skeletans on faces of peds; 40 percent channers; strongly acid; clear smooth boundary.
Bw—5 to 16 inches; light yellowish brown (10YR 6/4) extremely channery loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure parting to moderate very fine and fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine tubular and interstitial pores; 65 percent channers; strongly acid; abrupt wavy boundary.
R—16 inches; hard argillite bedrock with a few vertical cracks; few fine roots in some cracks.

### Range in Characteristics

*Soil temperature:* 35 to 42 degrees F
*Moisture control section:* Between 4 and 12 inches

*Depth to bedrock:* 10 to 20 inches
*Surface fragments:* 0 to 3 percent stones

*E horizon*
Value: 5 or 6 dry; 2 to 5 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent stones; 0 to 25 percent cobbles; 20 to 45 percent gravel or channers
Reaction: pH 5.1 to 6.5

*Bw horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Clay content: 15 to 25 percent
Content of rock fragments: 60 to 80 percent stones, cobbles, and gravel or channers
Reaction: pH 5.1 to 6.5

## *Crackerville Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium and residuum from granite
*Slope range:* 4 to 60 percent
*Elevation range:* 3,500 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Crackerville gravelly loam, in an area of Clasoil-Crackerville complex, 15 to 35 percent slopes, in an area of rangeland, 1,320 feet south and 1,320 feet west of the northeast corner of sec. 33, T. 5 N., R. 9 W.

A—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine tubular pores; 10 percent gravel; slightly acid; clear wavy boundary.

Bt—7 to 11 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; common distinct clay films bridging sand grains; 45 percent gravel; neutral; gradual irregular boundary.

BC—11 to 17 inches; light brownish gray (10YR 6/2) very gravelly coarse sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine roots; common very fine and fine tubular pores; 55 percent gravel; neutral; gradual irregular boundary.

C—17 to 29 inches; pale brown (10YR 6/3) extremely gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; 70 percent gravel; neutral; gradual irregular boundary.

Cr—29 to 35 inches; granite bedrock which crushes to very gravelly loamy coarse sand.
R—35 inches; granite bedrock.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the argillic horizon:* 7 to 15 inches
*Depth to the Cr horizon:* 20 to 38 inches
*Depth to bedrock:* 23 to 40 inches

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 14 to 22 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
Reaction: pH 5.1 to 7.3

*Bt horizon*
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 3, 4, or 6
Clay content: 20 to 30 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent gravel
Reaction: pH 6.1 to 7.8

*BC horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4 or 6
Texture: Sandy loam, coarse sandy loam, or loamy coarse sand
Clay content: 5 to 20 percent
Content of rock fragments: 30 to 70 percent—0 to 15 percent cobbles; 30 to 55 percent gravel
Reaction: pH 6.6 to 7.8

*C horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Loamy sand or loamy coarse sand
Clay content: 5 to 15 percent
Content of rock fragments: 30 to 75 percent—0 to 15 percent cobbles; 30 to 70 percent gravel
Reaction: pH 6.6 to 7.3

## *Cujob Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountain slumps and depressions
*Parent material:* Alluvium
*Slope range:* 1 to 4 percent
*Elevation range:* 6,600 to 7,600 feet
*Annual precipitation:* 18 to 30 inches

*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 60 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Cumulic Cryaquolls

## Typical Pedon

Cujob mucky silt loam, in an area of Worock-Finn-Cujob complex, 1 to 25 percent slopes, in an area of wet meadow rangeland, 200 feet west and 2,350 feet south of the northeast corner of sec. 7, T. 3 N., R. 11 W.

A—0 to 4 inches; black (10YR 2/1) mucky silt loam, very dark gray (10YR 3/1) dry; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine discontinuous tubular pores; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bw1—4 to 11 inches; black (10YR 2/1) mucky loam, very dark gray (7.5YR 3/1) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and common very fine roots; common very fine and fine discontinuous tubular pores; 10 percent gravel; slightly alkaline; clear wavy boundary.

Bw2—11 to 21 inches; black (7.5YR 2/1) very gravelly loam, dark gray (7.5YR 4/1) dry; few fine faint yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) dry redox concentrations; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and common very fine roots; few fine and common very fine discontinuous tubular pores; 10 percent cobbles; 30 percent gravel; slightly alkaline; gradual wavy boundary.

C1—21 to 33 inches; reddish brown (5YR 5/4) very cobbly clay loam, light brown (7.5YR 6/3) dry; few fine faint yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) dry redox concentrations; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine discontinuous tubular pores; 20 percent cobbles; 30 percent gravel; moderately alkaline; gradual wavy boundary.

C2—33 to 60 inches; reddish brown (5YR 5/4) very cobbly clay loam, brown (7.5YR 5/3) dry; few fine faint yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) dry redox concentrations; massive; hard, friable, moderately sticky, moderately plastic; 25 percent cobbles; 35 percent gravel; moderately alkaline.

## Range in Characteristics

*Mean annual soil temperature:* 37 to 40 degrees F
*Mean summer soil temperature:* 50 to 55 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 20 to 25 inches
*Depth to the seasonal high water table:* Ponded to 12 inches

*A horizon*
- Value: 3 or 4 dry
- Chroma: 1 or 2
- Clay content: 10 to 18 percent
- Content of rock fragments: 0 to 10 percent gravel
- Reaction: pH 6.6 to 7.8

*Bw1 horizon*
- Hue: 10YR or 7.5YR
- Value: 1 or 2 moist; 3 or 4 dry
- Chroma: 1 or 2
- Clay content: 10 to 18 percent

Content of rock fragments: 5 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bw2 horizon*
Hue: 10YR or 7.5YR
Value: 1 or 2 moist; 3 or 4 dry
Chroma: 1 or 2
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent gravel
Reaction: pH 6.6 to 7.8

*C horizons*
Hue: 7.5YR or 5YR
Value: 4 or 5 moist; 5 or 6 dry
Chroma: 3 or 4
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 20 to 35 percent gravel
Reaction: pH 7.4 to 8.4

## *Danaher Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Mountains
*Parent material:* Alluvium
*Slope range:* 4 to 35 percent
*Elevation range:* 5,600 to 8,100 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Ustic Glossocryalfs

### Typical Pedon

Danaher loam, 4 to 15 percent slopes, in an area of forestland, 175 feet north and 850 feet east of the southwest corner of sec. 8, T. 2 N., R. 12 W.

Oe—0 to 1 inch; decomposed organic matter.
Oi—1 to 3 inches; partially decomposed organic matter.
E1—3 to 10 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine tubular and irregular pores; 2 percent gravel; moderately acid; clear wavy boundary.
E2—10 to 18 inches; light gray (10YR 7/2) sandy loam, brown (10YR 5/3) moist; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine tubular pores; 5 percent gravel; moderately acid; clear wavy boundary.
Bt/E—18 to 24 inches; B part (60 percent) brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; E part (40 percent) light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist tongues; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; many very fine and fine tubular pores; few faint clay films on faces of peds; 5 percent gravel; slightly acid; gradual wavy boundary.

Bt1—24 to 37 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; strong medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few fine roots; common very fine and fine tubular and interstitial pores; many distinct clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

Bt2—37 to 43 inches; light yellowish brown (10YR 6/4) silty clay, pale brown (10YR 6/3) moist; moderate medium prismatic structure parting to strong fine and medium angular blocky; very hard, very firm, very sticky, very plastic; few fine roots; few very fine and fine tubular pores; continuous distinct clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

Bt3—43 to 49 inches; yellowish brown (10YR 5/6) silty clay, dark yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine roots; many very fine and fine random tubular pores; common distinct clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

Bt4—49 to 55 inches; light gray (10YR 7/2) silty clay, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few fine roots; few very fine and fine tubular pores; common distinct clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

C—55 to 60 inches; pale brown (10YR 6/3) gravelly sandy clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, moderately sticky, slightly plastic; many very fine and fine random irregular pores; 20 percent gravel; moderately acid.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bt horizon:* 12 to 25 inches

*E horizons*

Hue: 10YR or 5YR
Value: 3 to 6 moist; 6 to 8 dry
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 20 percent gravel
Reaction: pH 5.6 to 7.3

*Bt/E horizon*

Value: B part: 4 or 5 moist; 5 or 6 dry; E part: 5 or 6 moist; 6 or 7 dry
Chroma: 2 or 3
Texture: Clay loam or loam
Clay content: 20 to 30 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 5.6 to 7.3

*Bt horizons*

Hue: 10YR or 5YR
Value: 4 to 7 moist; 5 to 8 dry
Chroma: 2 to 4 or 6
Texture: Clay loam, silty clay, or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 5.6 to 7.3

*C horizon*
Hue: 10YR or 5YR
Value: 4 to 6 moist; 5 to 7 dry
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Clay content: 35 to 40 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 5.6 to 7.3

## *Danielvil Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Stream terraces and alluvial fans
*Parent material:* Alluvium
*Slope range:* 2 to 4 percent
*Elevation range:* 5,800 to 6,900 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive Ustic Haplocryolls

### Typical Pedon

Danielvil loam, 2 to 4 percent slopes, in an area of rangeland, 1,320 feet west and 120 feet south of the northeast corner of sec. 12, T. 1 S., R. 15 W.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine interstitial pores; neutral; clear smooth boundary.

A2—7 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine interstitial pores; 5 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.

Bw—12 to 21 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common very fine interstitial pores; 5 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.

C1—21 to 34 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky, nonplastic; few fine and common very fine roots; common very fine interstitial pores; 5 percent cobbles; 10 percent gravel; neutral; gradual smooth boundary.

C2—34 to 60 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, slightly sticky, nonplastic; few very fine and fine roots; common very fine interstitial pores; 5 percent cobbles; 10 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the mollic epipedon:* 7 to 15 inches

*A horizons*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 7.3

*Bw horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel
Reaction: pH 6.6 to 7.3

*C horizons*
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel
Reaction: pH 6.6 to 7.3

## *Danvers Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 3,800 to 6,800 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, smectitic, frigid Vertic Argiustolls

### Typical Pedon

Danvers clay loam, 4 to 8 percent slopes, in an area of irrigated pasture, 2,450 feet west and 1,300 feet north of the southeast corner of sec. 18, T. 7 N., R. 8 W.; Powell County, Montana.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, slightly plastic; few medium and many

fine roots; many fine and medium irregular pores; neutral; abrupt smooth boundary.

A2—4 to 8 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, moderately sticky, moderately plastic; few medium and many fine roots; common fine tubular and many fine random irregular pores; neutral; clear wavy boundary.

Bt—8 to 16 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; very hard, friable, very sticky, very plastic; common fine roots; few fine tubular pores; common distinct brown (10YR 5/3) clay films on all surfaces; slightly alkaline; clear wavy boundary.

Btk—16 to 21 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, very plastic; common fine roots; common fine random tubular pores; few faint clay films on faces of peds; many fine and medium masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—21 to 38 inches; white (10YR 8/1) clay loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, moderately plastic; common fine roots; few medium random and many fine tubular pores; 5 percent gravel; disseminated lime; common lime pendants on gravel; violently effervescent; strongly alkaline; gradual wavy boundary.

Bk2—38 to 60 inches; light brownish gray (10YR 6/2) gravelly clay loam; grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common fine random tubular and irregular pores; 5 percent cobbles; 15 percent gravel; disseminated lime; common lime pendants on gravel; violently effervescent; strongly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 12 inches
*Depth to the calcic horizon:* 14 to 25 inches

*A horizons*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.3

*Bt horizon*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 6 dry; 2 to 5 moist
Chroma: 2 to 4
Texture: Clay loam, silty clay, or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Btk horizon*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

*Bk horizons*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 1 to 3
Texture: Clay loam or silty clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 20 percent cobbles; 5 to 15 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 9.0

## *Daras Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Side slopes of mountains and hills
*Parent material:* Colluvium and alluvium from welded tuff
*Slope range:* 4 to 15 percent
*Elevation range:* 6,300 to 6,900 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 60 days

**Taxonomic Class:** Ashy, glassy Vitrandic Eutrocryepts

### Typical Pedon

Daras gravelly ashy sandy loam, in an area of Daras-Bendoh-Karloff complex, 4 to 15 percent slopes, moderately impacted, in an area of forestland, 1,100 feet north and 1,650 feet west of the southeast corner of sec. 16, T. 3 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.
A—1 to 4 inches; grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 20 percent gravel; strongly acid; clear wavy boundary.
E—4 to 8 inches; light gray (10YR 6/1) very gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine roots; many very fine and fine tubular pores; 10 percent cobbles; 30 percent gravel; moderately acid; clear wavy boundary.
Bw—8 to 17 inches; pale brown (10YR 6/3) gravelly ashy sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine and fine tubular pores; 20 percent gravel; slightly acid; gradual wavy boundary.
BC—17 to 36 inches; light gray (2.5Y 7/2) gravelly ashy coarse sandy loam, olive

gray (5Y 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky, nonplastic; few medium and coarse and common very fine and fine roots; common very fine and fine tubular pores; 20 percent gravel; slightly acid; gradual irregular boundary.

C1—36 to 52 inches; light brownish gray (2.5Y 6/2) gravelly ashy coarse sandy loam, olive gray (5Y 4/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine and fine roots; few very fine and fine tubular pores; 25 percent gravel; slightly acid; gradual irregular boundary.

C2—52 to 60 inches; light gray (N 6/) very gravelly ashy coarse sandy loam, olive gray (5Y 4/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; 5 percent cobbles; 40 percent gravel; neutral.

## Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 8 and 24 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 4 or 5 dry; 3 or 4 moist
- Chroma: 2 or 3
- Clay content: 10 to 20 percent
- Content of rock fragments: 15 to 35 percent—0 to 15 percent stones and cobbles; 5 to 35 percent gravel
- Reaction: pH 5.1 to 6.0

*E horizon*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 1 to 3
- Texture: Ashy loamy coarse sand, ashy coarse sandy loam, or ashy loam
- Clay content: 5 to 18 percent
- Content of rock fragments: 15 to 45 percent—0 to 15 percent stones and cobbles; 15 to 30 percent gravel
- Reaction: pH 5.1 to 6.5

*Bw and BC horizons*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 1 to 3
- Texture: Ashy sandy loam, ashy loam, or ashy coarse sandy loam
- Clay content: 8 to 18 percent
- Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent gravel
- Reaction: pH 6.1 to 7.3

*C horizons*
- Hue: 2.5Y, 5Y, or N
- Value: 6 or 7 dry; 4 to 6 moist
- Chroma: 1 or 2
- Texture: Ashy sandy loam, ashy coarse sandy loam, ashy loamy coarse sand, or ashy loamy sand
- Clay content: 5 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 15 percent stones and cobbles; 15 to 45 percent gravel
Reaction: pH 6.1 to 7.3

## *Donald Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 5,800 to 6,600 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, smectitic Alfic Argicryolls

### Typical Pedon

Donald loam, 4 to 8 percent slopes, in an area of rangeland, 2,300 feet east and 1,500 feet north of the southwest corner of sec. 17, T. 5 N., R. 14 W.; Granite County, Montana.

A1—0 to 5 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to strong medium granular; hard, firm, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine tubular pores; 5 percent gravel; neutral; clear smooth boundary.

A2—5 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to strong medium granular; hard, firm, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine tubular pores; 5 percent stones; 5 percent gravel; neutral; clear wavy boundary.

E—9 to 13 inches; pinkish gray (7.5YR 7/2) sandy loam, brown (7.5YR 5/2) moist; weak coarse subangular blocky structure; hard, firm, nonsticky, nonplastic; many very fine, fine, and medium roots; many fine irregular pores; 3 percent stones; 5 percent cobbles; 5 percent gravel; neutral; abrupt wavy boundary.

Bt1—13 to 16 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; strong medium columnar structure; very hard, very firm, very sticky, very plastic; common fine roots; few very fine and fine tubular pores; many continuous distinct unstained sand grains on tops of columns and discontinuous distinct unstained sand grains on vertical faces of peds; many distinct clay films on vertical faces of peds and in pores; neutral; clear wavy boundary.

Bt2—16 to 23 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; moderate medium prismatic structure; very hard, very firm, very sticky, very plastic; common fine roots; few very fine and fine tubular pores; many distinct clay films on faces of peds and in pores; slightly alkaline; clear wavy boundary.

Btk—23 to 35 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; moderate medium angular blocky structure; very hard, very firm, very sticky, very plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds and in pores; common medium irregular seams of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

BC—35 to 60 inches; light brown (7.5YR 6/4) clay; light brown (7.5YR 6/4) moist; massive; hard, firm, moderately sticky, moderately plastic; few fine tubular pores; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 13 inches
*Depth to the Btk horizon:* 21 to 40 inches

*A horizons*
Value: 2 to 4 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Loam or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 20 cobbles; 0 to 15 percent gravel
Reaction: pH 6.6 to 7.3

*E horizon*
Value: 6 or 7 dry; 5 or 6 moist
Texture: Loam or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.6 to 7.3

*Bt1 horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 6.6 to 7.3

*Bt2 horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 6.6 to 7.8

*Btk horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Clay loam or clay
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 7.4 to 8.4

*BC horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 to 6 moist
Chroma: 3 or 4
Texture: Clay loam or clay
Clay content: 35 to 60 percent

Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 7.4 to 8.4

## *Dougcliff Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Rapid (6 to 20 inches/hour)
*Landform:* Closed depressions, swales, and flood plains
*Parent material:* Organic material
*Slope range:* 0 to 2 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Euic, frigid Typic Haplofibrists

The Dougcliff soil in map unit 686A is a taxadjunct to the Series. It classifies as Loamy, mixed, euic, frigid Terric Haplofibrists. Use and management is similar.

### Typical Pedon

Dougcliff mucky peat, 0 to 2 percent slopes, ponded, 200 feet north and 300 feet east of the southwest corner of sec. 2, T. 7 N., R. 10 W.; Powell County, Montana.

Oe1—0 to 13 inches; black (10YR 2/1) mucky peat, very dark gray (10YR 3/1) dry; about 80 percent fiber and raw herbaceous plant material, 70 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear wavy boundary.

Oe2—13 to 27 inches; black (10YR 2/1) mucky peat, black (10YR 2/1) dry; about 85 percent fiber, 80 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear wavy boundary.

Oe3—27 to 60 inches; black (10YR 2/1) mucky peat, very dark gray (10YR 3/1) dry; about 80 percent fiber, 75 percent rubbed; massive; nonsticky, nonplastic; slightly acid.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Depth to the seasonal high water table:* 0 to 6 inches

*Oe1 horizon*
Hue: 10YR or 7.5YR
Value: 2 or 3 moist
Chroma: 1 or 2
Fiber content: 80 to 90 percent unrubbed; 65 to 75 percent rubbed
Reaction: pH 6.1 to 7.8

*Oe2 horizon*
Hue: 10YR, 7.5YR, or 5YR
Value: 2 or 3 moist
Chroma: 1 or 2
Fiber content: 85 to 95 percent unrubbed; 75 to 85 percent rubbed
Reaction: pH 6.1 to 7.8

*Oe3 horizon*
Hue: 10YR, 7.5YR, or 5YR
Value: 2 or 3 moist
Fiber content: 75 to 85 percent unrubbed; 60 to 75 percent rubbed
Reaction: pH 6.1 to 7.8

## *Dunkleber Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Flood plains, drainageways, and closed depressions
*Parent material:* Organic material
*Slope range:* 0 to 2 percent
*Elevation range:* 4,740 to 8,800 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Euic Typic Cryofibrists

### Typical Pedon

Dunkleber mucky peat, 0 to 2 percent slopes, 1,300 feet west and 1,500 feet north of the southeast corner of sec. 19, T. 5 N., R. 14 W.

Oi1—0 to 12 inches; black (10YR 2/1) mucky peat, dark gray (10YR 4/1) dry; about 80 percent fiber and raw herbaceous plant material, 70 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear smooth boundary.
Oi2—12 to 28 inches; very dark gray (10YR 3/1) mucky peat, dark gray (10YR 4/1) dry; about 85 percent fiber, 80 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear smooth boundary.
Oi3—28 to 38 inches; black (10YR 2/1) mucky peat, dark gray (10YR 4/1) dry; about 80 percent fiber, 75 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear wavy boundary.
Oi4—38 to 44 inches; black (10YR 2/1) mucky peat, dark gray (10YR 4/1) dry; about 80 percent fiber, 75 percent rubbed; massive; nonsticky, nonplastic; slightly acid; clear smooth boundary.
Oi5—44 to 60 inches; black (10YR 2/1) mucky peat, very dark gray (10YR 3/1) dry; about 80 percent fiber, 75 percent rubbed; massive; nonsticky, nonplastic; slightly acid.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Depth to the seasonal high water table:* Ponded to 6 inches
*Thickness of organic material:* Greater than 52 inches

*Oi1 horizon*
Value: 2 or 3 moist; 4 or 5 dry
Chroma: 1 or 2
Fiber content: 80 to 90 percent unrubbed, 60 to 75 percent rubbed
Reaction: pH 6.1 to 6.5

*Oi2 horizon*
Value: 2 to 4 moist; 3 to 5 dry
Chroma: 1 or 2

Fiber content: 80 to 90 percent unrubbed, 70 to 80 percent rubbed
Reaction: pH 6.1 to 6.5

*Oi3 horizon*
Value: 2 or 3 moist; 3 or 4 dry
Chroma: 1 or 2
Fiber content: 80 to 90 percent unrubbed, 70 to 80 percent rubbed
Reaction: pH 6.1 to 6.5

*Oi4 horizon*
Value: 2 or 3 moist; 4 or 5 dry
Chroma: 1 or 2
Fiber content: 80 to 90 percent unrubbed, 70 to 80 percent rubbed
Reaction: pH 6.1 to 6.5

*Oi5 horizon*
Value: 2 or 3 moist; 3 or 4 dry
Chroma: 1 or 2
Content of rock fragments: 0 to 25 percent gravel
Reaction: pH 6.1 to 6.5

## *Eine Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour) to 8 inches, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 5,800 to 6,100 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Sandy-skeletal, mixed Argic Cryaquolls

### Typical Pedon

Eine loam, in an area of Eine-Nana complex, 0 to 2 percent slopes, in an area of rangeland, 1,550 feet east and 550 feet south of the northwest corner of sec. 33, T. 1 N., R. 14 W.

A1—0 to 2 inches; very dark brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine interstitial pores; strongly alkaline; clear smooth boundary.

A2—2 to 4 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; strongly alkaline; clear smooth boundary.

Btn—4 to 8 inches; very dark gray (10YR 3/1) sandy clay loam, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; common very fine tubular pores; common faint clay films on faces of peds; strongly alkaline; clear smooth boundary.

BCn—8 to 12 inches; grayish brown (10YR 5/2) very fine sandy loam, light brownish

gray (10YR 6/2) dry; weak medium subangular blocky structure; hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine tubular pores; slightly effervescent; very strongly alkaline; clear wavy boundary.

2Cn1—12 to 20 inches; dark grayish brown (10YR 4/2) sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; common very fine roots; few medium tubular pores; 10 percent gravel; very strongly alkaline; clear smooth boundary.

2Cn2—20 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; common very fine roots; few medium tubular pores; 15 percent cobbles; 35 percent gravel; very strongly alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 40 degrees F
*Moisture control section:* Between 12 and 35 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Depth to the 2C horizon:* 8 to 13 inches

*A1 horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 18 to 27 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 8.5 to 9.0

*A2 horizon*
Value: 4 or 5 dry; 3 moist
Chroma: 1 or 2
Texture: Loam, silt loam, or sandy loam
Clay content: 10 to 15 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 30 to 50
Reaction: pH 8.5 to 9.0

*Btn horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry
Chroma: 1 or 2
Texture: Sandy clay loam or clay loam
Clay content: 27 to 35 percent
Sodium adsorption ratio: 13 to 30
Reaction: pH 8.5 to 9.6

*BCn horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Very fine sandy loam, loam, or sandy loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 0 to 5 percent
Sodium adsorption ratio: 13 to 30
Reaction: pH 8.5 to 9.6

*2Cn1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 0 to 10 percent gravel
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.9 to 9.6

*2Cn2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.9 to 9.6

## *Elkner Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountainsides
*Parent material:* Colluvium from granite
*Slope range:* 8 to 60 percent
*Elevation range:* 6,300 to 8,600 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive Lamellic Eutrocryepts

### Typical Pedon

Elkner stony sandy loam, in an area of Comad-Elkner complex, 15 to 35 percent slopes, in an area of woodland, 600 feet east and 200 feet north of the southwest corner of sec. 4, T. 2 N., R. 11 W.

Oi—0 to 1 inch; slightly decomposed needles and twigs.

E—1 to 6 inches; light brownish gray (10YR 6/2) stony sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine interstitial pores; 10 percent stones; 5 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.

E and Bt1—6 to 16 inches; E part (75 percent) is light yellowish brown (10YR 6/4) stony coarse sandy loam, brown (10YR 4/3) moist; B part (25 percent) is yellowish brown (10YR 5/4) sandy loam lamellae 1/8- to 1/4-inch thick, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine interstitial pores; 10 percent stones; 5 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.

E and Bt2—16 to 33 inches; E part (75 percent) is light yellowish brown (10YR 6/4) gravelly coarse sandy loam, brown (10YR 4/3) moist; B part (25 percent) is yellowish brown (10YR 5/4) sandy loam lamellae 1/8- to 1/4-inch thick, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine interstitial pores; 5 percent cobbles; 15 percent gravel; moderately acid; gradual wavy boundary.

BC—33 to 60 inches; pale brown (10YR 6/3) stony loamy coarse sand, brown (10YR 5/3) moist; massive; hard, friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 10 percent stones; 5 percent cobbles; 15 percent gravel; slightly acid.

### Range in Characteristics

*Soil temperature:* 37 to 40 degrees F
*Moisture control section:* Between 8 and 24 inches

*E horizon*
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 5 to 35 percent—5 to 15 percent stones or boulders; 0 to 10 percent cobbles; 5 to 15 percent gravel
Reaction: pH 5.6 to 6.5

*E and Bt horizons*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Coarse sandy loam or sandy loam
Clay content: 5 to 10 percent
Content of rock fragments: 5 to 35 percent—0 to 15 percent stones or boulders; 0 to 15 percent cobbles; 5 to 20 percent gravel
Reaction: pH 5.6 to 6.5

*BC horizon*
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Coarse sandy loam, sandy loam, or loamy coarse sand
Clay content: 0 to 5 percent
Content of rock fragments: 5 to 35 percent—5 to 15 percent stones or boulders; 0 to 15 percent cobbles; 5 to 20 percent gravel
Reaction: pH 5.6 to 6.5

## *Ellena Series*

*Depth class:* Moderately deep (20 to 40 inches) (20 to 40 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Footslopes and side slopes of hills and mountains
*Parent material:* Local colluvium and residuum from granite
*Slope range:* 35 to 60 percent
*Elevation range:* 6,400 to 7,000 feet
*Annual precipitation:* 15 to 25 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Eutrocryepts

## Typical Pedon

Ellena very cobbly sandy loam, in an area of Ellena very cobbly sandy loam, in an area of Kurrie, very bouldery-Ellena, very bouldery-Rock outcrop complex, 25 to 60 percent slopes, in an area of forestland, 350 feet north and 1,700 feet west of the southeast corner of sec. 18, T. 9 N., R. 3 W.; Jefferson County, Montana.

Oi—0 to 2 inches; partially decomposed needles, leaves, and twigs.

A—2 to 7 inches; grayish brown (10YR 5/2) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few medium, common fine, and many very fine roots; many very fine and fine tubular pores; 30 percent cobbles; 10 percent granite gravel; neutral; clear smooth boundary.

E—7 to 22 inches; light brownish gray (2.5Y 6/2) very cobbly coarse sandy loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few fine and medium and many very fine roots; many very fine and fine tubular pores; 5 percent stones; 25 percent cobbles; 10 percent granite gravel; slightly acid; clear wavy boundary.

E/Bw—22 to 35 inches; E part (85 percent) is light brownish gray (2.5Y 6/2) very cobbly coarse sandy loam, grayish brown (2.5Y 5/2) moist; B part (15 percent) is light olive brown (2.5Y 5/4) very cobbly sandy clay loam, olive brown (2.5Y 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; few fine and medium and many very fine roots; few fine and many very fine tubular pores; 5 percent stones; 35 percent cobbles; 10 percent granite gravel; slightly acid; clear wavy boundary.

Cr—35 to 38 inches; light brownish gray (2.5Y 6/2) decomposing granite bedrock (grus) that crushes to very gravelly coarse sand.

R—38 inches, hard granite bedrock.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 8 and 24 inches
*Depth to the Cr horizon:* 20 to 38 inches
*Depth to bedrock:* 23 to 40 inches
*Surface fragments:* 0 to 3 percent boulders

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 to 4
- Texture: Coarse sandy loam or sandy loam
- Clay content: 10 to 20 percent
- Content of rock fragments: 0 to 45 percent—0 to 30 percent stones and cobbles; 0 to 15 percent gravel
- Reaction: pH 6.1 to 7.3

*E horizon*
- Hue: 10YR or 2.5Y
- Value: 6 to 8 dry; 4 to 6 moist
- Chroma: 1 to 3
- Texture: Coarse sandy loam, sandy loam, or loam
- Clay content: 10 to 18 percent

Content of rock fragments: 20 to 60 percent—0 to 45 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 6.1 to 7.3

*E/Bw horizon*
Hue: 10YR or 2.5Y
Value: E part: 6 to 8 dry; 4 to 6 moist; B part: 4 to 6 dry; 3 to 5 moist
Chroma: E part: 1 to 4; B part: 2 to 4
Texture: Coarse sandy loam or sandy loam
Clay content: 10 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 40 percent stones and cobbles; 10 to 30 percent gravel
Reaction: pH 6.1 to 7.3

## *Elliston Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Flood plains
*Parent material:* Loamy alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,000 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aquic Haplustepts

### Typical Pedon

Elliston loam, 0 to 4 percent slopes, rarely flooded, in an area of woodland, 2,600 feet south and 1,200 feet west of the northeast corner of sec. 26, T. 14 N., R. 11 W.; Powell County, Montana.

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.

A—1 to 8 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; strong medium granular structure; slightly hard, friable, nonsticky, slightly plastic; few very coarse and many very fine and fine roots; many very fine and fine interstitial pores; moderately alkaline; clear smooth boundary.

Bw—8 to 13 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk—13 to 45 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; many fine distinct yellowish red (5YR 5/8) redox concentrations; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—45 to 60 inches; light gray (10YR 7/2) very gravelly loam; grayish brown (10YR 5/2) moist; many fine distinct yellowish red (5YR 5/8) redox concentrations; massive; soft, friable, slightly sticky, nonplastic; few fine roots; many very fine and fine interstitial pores; 40 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 6 to 24 inches
*Depth to the seasonal high water table:* 24 to 42 inches

*A horizon*
Value: 4 or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Reaction: pH 7.9 to 8.4

*Bw horizon*
Value: 5 or 6 dry; 3 or 4 moist
Clay content: 18 to 27 percent
Reaction: pH 7.9 to 8.4

*Bk horizon*
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

*2C horizon*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 8 to 20 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel
Reaction: pH 7.9 to 8.4

## *Elve Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium
*Slope range:* 4 to 85 percent
*Elevation range:* 5,000 to 8,600 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Eutrocryepts

### Typical Pedon

Elve gravelly loam, 35 to 60 percent slopes, in an area of woodland, 1,700 feet south and 1,800 feet west of the northeast corner of sec. 24, T. 11 N., R. 8 W.; Powell County, Montana.

Oe—0 to 2 inches; partially decomposed forest litter.
A—2 to 7 inches; light gray (10YR 7/2) gravelly loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few

coarse, common medium, and many very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 20 percent gravel; moderately acid; clear wavy boundary.

E—7 to 18 inches; very pale brown (10YR 7/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 35 percent gravel; strongly acid; clear wavy boundary.

Bw1—18 to 28 inches; light brownish gray (10YR 6/2) extremely gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few coarse and common very fine and fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 55 percent gravel; slightly acid; clear wavy boundary.

Bw2—28 to 42 inches; very pale brown (10YR 8/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 65 percent gravel; slightly acid; clear wavy boundary.

BC—42 to 60 inches; very pale brown (10YR 8/3) extremely gravelly sandy loam; brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores; 20 percent cobbles; 50 percent gravel; slightly acid.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Surface fragments:* 0 to 3 percent stones; boulders

*A horizon*
Hue: 7.5YR or 10YR
Value: 4 to 7 dry; 2 to 5 moist
Chroma: 2 to 4
Texture: Sandy loam, coarse sandy loam, or loam
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 60 percent—5 to 30 percent stones and cobbles; boulders; 10 to 30 percent gravel
Reaction: pH 5.1 to 6.5

*E horizon*
Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 85 percent—10 to 40 percent cobbles; 20 to 35 percent gravel
Reaction: pH 5.1 to 6.5

*Bw1 horizon*
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4 or 6
Texture: Loam or sandy loam
Clay content: 10 to 20 percent

Content of rock fragments: 60 to 85 percent—25 to 40 percent cobbles; 25 to 55 percent gravel
Reaction: pH 5.1 to 6.5

*Bw2 and BC horizons*
Hue: 7.5YR or 10YR
Value: 6 to 8 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 60 to 85 percent—20 to 40 percent cobbles; 35 to 65 percent gravel
Reaction: pH 5.1 to 6.5

## *Eremis Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium from welded tuff and rhyolite
*Slope range:* 2 to 35 percent
*Elevation range:* 5,500 to 7,800 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy, glassy Vitrandic Eutrocryepts

### Typical Pedon

Eremis gravelly ashy loam, in an area of Bendoh-Eremis-Karloff complex, 2 to 15 percent slopes moderately impacted, in an area of forestland, 1,500 feet east and 2,100 feet north of the southwest corner of sec. 16, T. 3 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.
A—1 to 3 inches; dark grayish brown (2.5Y 4/2) gravelly ashy loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and common very fine and fine roots; common very fine and fine tubular pores; 20 percent gravel; strongly acid; clear wavy boundary.
Bw—3 to 12 inches; light brownish gray (10YR 6/2) gravelly ashy loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; slightly hard, very friable, slightly sticky, nonplastic; common medium and many very fine and fine roots; many very fine and fine tubular pores; 20 percent gravel; strongly acid; gradual wavy boundary.
BC—12 to 25 inches; light gray (2.5Y 7/2) gravelly ashy sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and medium roots; common fine tubular pores; 25 percent gravel; moderately acid; gradual irregular boundary.
C1—25 to 36 inches; light brownish gray (2.5Y 6/2) gravelly ashy sandy clay loam, olive (5Y 4/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine tubular pores; 20 percent gravel; slightly acid; gradual irregular boundary.

C2—36 to 60 inches; light gray (N 7/) ashy sandy clay loam, olive (5Y 4/3) moist; massive; slightly hard, firm, slightly sticky, slightly plastic; 10 percent gravel; neutral.

### Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent

*A horizon*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 25 percent
Content of rock fragments: 15 to 45 percent—0 to 15 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 6.0

*Bw horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 1 to 3
Texture: Ashy loam or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 6.0

*BC horizon*
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Ashy loam or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.6 to 6.5

*C horizons*
Hue: 2.5Y, 5Y, or N
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 10 to 25 percent
Content of rock fragments: 10 to 35 percent—0 to 10 percent stones and cobbles; 10 to 25 percent gravel
Reaction: pH 6.1 to 7.3

## *Evaro Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Volcanic ash over colluvium

*Slope range:* 4 to 60 percent
*Elevation range:* 5,400 to 9,200 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lamellic Eutrocryepts

## Typical Pedon

Evaro gravelly ashy loam, in an area of Evaro gravelly loam, dry, 15 to 35 percent slopes, in an area of woodland, 700 feet north and 300 feet east of the southwest corner of sec. 6, T. 12 N., R. 13 W.; Powell County, Montana.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.

A—2 to 8 inches; pale brown (10YR 6/3) gravelly ashy loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; few coarse and many very fine, fine, and medium roots; many very fine and fine irregular pores; 5 percent cobbles; 25 percent gravel; moderately acid; clear smooth boundary.

2E—8 to 23 inches; light gray (10YR 7/2) extremely gravelly loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine irregular pores; 10 percent cobbles; 50 percent gravel; slightly acid; gradual wavy boundary.

2E and Bt1—23 to 42 inches; E part (75 percent) is very pale brown (10YR 7/3) extremely gravelly loam, pale brown (10YR 6/3) moist; B part (25 percent) is pale brown (10YR 6/3) extremely gravelly loam lamellae $^1/_{16}$- to $^1/_4$-inch thick, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few very fine and fine roots; many very fine and fine irregular pores; 5 percent cobbles; 65 percent gravel; neutral; gradual wavy boundary.

2E and Bt2—42 to 60 inches; E part (80 percent) is very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; B part (20 percent) is pale brown (10YR 6/3) extremely gravelly loam lamellae $^1/_{16}$- to $^1/_4$-inch thick, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine irregular pores; 5 percent cobbles; 65 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the volcanic ash-influenced A horizon:* 3 to 6 inches

*A horizon*
- Hue: 10YR or 7.5YR
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 3 to 5
- Clay content: 5 to 15 percent
- Content of rock fragments: 15 to 50 percent—0 to 25 percent stones and cobbles; 15 to 25 percent gravel
- Reaction: pH 5.6 to 6.5

*2E horizon*
- Hue: 10YR or 7.5YR
- Value: 6 to 8 dry; 5 to 7 moist
- Chroma: 2 or 3

Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 40 to 80 percent—5 to 30 percent cobbles; 35 to 50 percent gravel
Reaction: pH 5.6 to 7.3

*2E and Bt horizons*
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry; 4 to 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: E part: 2 or 3; B part: 3 or 4
Texture: Loam or sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 60 to 80 percent—5 to 15 percent cobbles; 55 to 65 percent gravel
Reaction: pH 5.6 to 7.3

## *Eyerbow Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 5,800 to 6,600 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Abruptic Argicryolls

### Typical Pedon

Eyerbow gravelly loam, 2 to 4 percent slopes, in an area of rangeland, 1,320 feet north and 1,150 feet west of the southeast corner of sec. 29, T. 1 N., R. 14 W.

A—0 to 5 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine tubular pores; 20 percent gravel; slightly acid; abrupt smooth boundary.

E—5 to 8 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine interstitial pores; 20 percent gravel; neutral; abrupt smooth boundary.

Bt—8 to 19 inches; brown (7.5YR 5/2) clay, brown (7.5YR 4/2) moist; strong coarse columnar structure parting to moderate medium angular blocky; extremely hard, very firm, very sticky, very plastic; few fine roots between peds; common very fine and fine tubular pores; many distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bk1—19 to 22 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine roots; common fine tubular pores; strongly effervescent; common fine and medium soft masses of lime; moderately alkaline; clear smooth boundary.

Bk2—22 to 60 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine roots; few fine tubular pores; strongly effervescent; disseminated lime; few fine masses of lime; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Note:* The surface layer meets the requirements of a mollic epipedon when mixed to 7 inches.

*A horizon*
Hue: 10YR or 7.5YR
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 20 to 25 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.8

*E horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.3

*Bt horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 45 to 60 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

*Bk horizons*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Silty clay or silty clay loam
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

## *Figaro Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans, mountains, and hills

*Parent material:* Alluvium and slope alluvium
*Slope range:* 8 to 25 percent
*Elevation range:* 6,200 to 6,800 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 60 days

**Taxonomic Class:** Ashy, glassy Vitrandic Haplocryalfs

## Typical Pedon

Figaro cobbly ashy loam, in an area of Karloff-Figaro-Bendoh complex, 8 to 25 percent slopes, moderately impacted, in an area of forestland, 1,950 feet east and 1,300 feet north of the southwest corner of sec. 16, T. 3 N., R. 11 W.

Oi—0 to 1/2 inch; partially decomposed needles, twigs, and leaves.
Oe—1/2 to 2 inches; decomposed needles, twigs, and leaves.
A—2 to 7 inches; dark grayish brown (2.5Y 4/2) cobbly ashy loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and many very fine and fine roots; 10 percent cobbles; 15 percent gravel; strongly acid; clear wavy boundary.
Bt/E—7 to 18 inches; B part (60 percent) grayish brown (2.5Y 5/2) cobbly ashy clay loam, brown (10YR 5/3) moist; E part (40 percent) light brownish gray (2.5Y 6/2) cobbly loam, pale brown (10YR 6/3) moist; moderate medium prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; few medium and many very fine and fine roots; few faint clay films bridging sand grains and on faces of peds in B part; 10 percent cobbles; 15 percent gravel; slightly acid; gradual wavy boundary.
Bt—18 to 30 inches; grayish brown (2.5Y 5/2) ashy clay loam, olive gray (5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, moderately plastic; few medium and many very fine and fine roots; many medium tubular pores; common distinct clay films on faces of peds; 10 percent gravel; slightly acid; gradual wavy boundary.
BC—30 to 43 inches; light gray (2.5Y 7/2) ashy clay loam, light olive gray (5Y 6/2) moist; moderate coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; few medium and coarse and many very fine and fine roots; common medium tubular pores; 10 percent gravel; slightly acid; gradual wavy boundary.
C—43 to 60 inches; light gray (2.5Y 7/2) ashy clay loam, olive (5Y 5/3) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine and medium roots; 5 percent gravel; neutral.

## Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the argillic horizon:* 6 to 16 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 15 percent stones and cobbles; 15 to 20 percent gravel
Reaction: pH 5.1 to 6.5

*Bt/E horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Ashy loam, ashy clay loam, or ashy sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 5.1 to 7.3

*Bt horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Ashy clay loam or ashy sandy clay
Clay content: 35 to 40 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 6.1 to 7.3

*BC and C horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Ashy loam or ashy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 6.1 to 7.8

## *Finn Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Flood plains, closed depressions, and drainageways
*Parent material:* Alluvium
*Slope range:* 0 to 25 percent
*Elevation range:* 5,400 to 7,800 feet
*Annual precipitation:* 15 to 30 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Typic Cryaquolls

### Typical Pedon

Finn gravelly loam, dry, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet north and 700 feet west of the southeast corner of sec. 5, T. 2 N., R. 12 W.

Oi—0 to 2 inches; partially decomposed organic matter.
A—2 to 12 inches; black (10YR 2/1) gravelly loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; slightly hard, very friable, nonsticky, slightly

plastic; common medium and many very fine and fine roots; many very fine and fine discontinuous tubular pores; 5 percent cobbles; 15 percent gravel; strongly acid; clear smooth boundary.

Bw1—12 to 18 inches; dark yellowish brown (10YR 3/4) very gravelly loam, yellowish brown (10YR 5/4) dry; common fine distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine and fine roots; many very fine and fine discontinuous tubular pores; 5 percent cobbles; 35 percent gravel; strongly acid; clear smooth boundary.

Bw2—18 to 24 inches; dark brown (10YR 3/3) very gravelly sandy clay loam, brown (10YR 5/3) dry; common fine distinct yellowish brown (10YR 5/8), brownish yellow (10YR 6/8) dry redox concentrations; weak fine subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; many very fine and fine discontinuous tubular pores; 10 percent cobbles; 40 percent gravel; moderately acid; gradual wavy boundary.

2C—24 to 60 inches; dark yellowish brown (10YR 4/4) very gravelly sandy clay loam, light yellowish brown (10YR 6/4) dry; many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; massive; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine discontinuous tubular pores; 15 percent cobbles; 40 percent gravel; moderately acid.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 15 inches
*Depth to the seasonal high water table:* Ponded to 12 inches

*A horizon*
Chroma: 1 or 2
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel
Reaction: pH 5.1 to 7.3

*Bw1 horizon*
Redox concentrations: 10YR 5/8 and 10YR 6/8
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent gravel
Reaction: pH 5.1 to 7.3

*Bw2 horizon*
Redox concentrations: 10YR 5/8 and 10YR 6/8
Texture: Sandy clay loam, loam, or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*2C horizon*
Redox concentrations: 10YR 5/8 and 10YR 6/8
Texture: Sandy clay loam or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 70 percent—15 to 25 percent cobbles; 20 to 45 percent gravel

Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 5.6 to 7.3

## *Fluvaquentic Endoaquolls*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Rapid (6 to 20 inches/hour)
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,600 to 5,000 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Fluvaquentic Endoaquolls

### Typical Pedon

Fluvaquentic Endoaquolls, in an area of Fluvaquentic Endoaquolls-Slickens complex, 0 to 2 percent slopes, severely impacted, in an area of pasture, 1,200 feet west and 1,700 feet south of the northeast corner of sec. 18, T. 5 N., R. 9 W.

Oi—0 to 2 inches; partially decomposed organic matter.

C—2 to 8 inches; strong brown (7.5YR 5/6) fine sandy loam, light yellowish brown (10YR 6/4) dry; massive; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; 1 percent gravel; very strongly acid; abrupt smooth boundary.

Ab1—8 to 14 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, very friable, moderately sticky, slightly plastic; common very fine, fine, medium, and coarse roots; few very fine irregular pores; 1 percent gravel; neutral; clear wavy boundary.

Ab2—14 to 22 inches; very dark grayish brown (2.5Y 3/2) loam, grayish brown (2.5Y 5/2) dry; few fine distinct reddish yellow (7.5YR 6/8) redox concentrations; weak medium granular structure; hard, friable, moderately sticky, slightly plastic; few medium and coarse and common very fine and fine roots; few fine and common very fine discontinuous irregular pores; 1 percent gravel; disseminated lime; slightly effervescent; slightly alkaline; abrupt wavy boundary.

C'—22 to 26 inches; dark brown (10YR 3/3) very fine sandy loam; light yellowish brown (10YR 6/4) dry; single grain; loose, slightly sticky, nonplastic; common very fine and fine roots; 1 percent gravel; slightly alkaline; abrupt wavy boundary.

Abg—26 to 38 inches; very dark gray (2.5Y 3/1) silty clay loam; gray (2.5Y 5/1) dry; common coarse black (2.5Y N/) redox depletions; massive; very hard, firm, moderately sticky, moderately plastic; common very fine roots; few fine and medium and common very fine discontinuous irregular pores; 1 percent gravel; slightly alkaline; abrupt smooth boundary.

2C—38 to 60 inches; brown (10YR 5/3) gravelly coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky, nonplastic; 15 percent gravel; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Depth to the 2C horizon:* 20 to 40 inches
*Depth to the seasonal high water table:* 12 to 24 inches

*C horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 4.5 to 7.3

*Ab horizons*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Loam or fine sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*C' horizon*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 3 or 4
Texture: Fine sandy loam or very fine sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

*Abg horizon*
Hue: 10YR, 2.5Y, or N
Value: 4 to 6 dry; 2 or 3 moist
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

*2C horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 3 or 4
Texture: Coarse sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 15 to 60 percent—0 to 10 percent cobbles; 15 to 50 percent gravel
Reaction: pH 7.4 to 8.4

## Foolhen Series

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Flood plains, closed depressions, and drainageways
*Parent material:* Alluvium
*Slope range:* 0 to 8 percent
*Elevation range:* 4,740 to 8,800 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive Typic Cryaquolls

## Typical Pedon

Foolhen loam, 0 to 4 percent slopes, in an area of rangeland, 700 feet north and 1,600 feet west of the southeast corner of sec. 31, T. 1 N., R. 14 W.

Oi—0 to 6 inches; partially decomposed organic matter.

Oe—6 to 11 inches; gray (10YR 4/1) mucky peat, dark gray (10YR 5/1) dry.

A—11 to 19 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.

Bg—19 to 24 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; many medium distinct light olive brown (2.5Y 5/6) and olive yellow (2.5Y 6/6) dry redox concentrations; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; many very fine and fine roots; common very fine tubular pores; slightly alkaline; clear smooth boundary.

Cg1—24 to 34 inches; gray (5Y 5/1) loam with lenses of very fine sandy loam 1- to 2-inches thick, gray (5Y 6/1) dry; many medium distinct light olive brown (2.5Y 5/6) and olive yellow (2.5Y 6/6) dry redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine tubular pores; moderately alkaline; gradual wavy boundary.

Cg2—34 to 46 inches; gray (5Y 5/1) gravelly sandy clay loam, gray (5Y 6/1) dry; many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine tubular pores; 20 percent gravel; moderately alkaline; gradual wavy boundary.

Cg3—46 to 60 inches; olive (5Y 5/3) silt loam, light gray (5Y 7/2) dry; many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; massive; slightly hard, friable, slightly sticky, moderately plastic; few very fine and fine roots; few fine irregular tubular pores; 40 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 19 inches
*Depth to the seasonal high water table:* Ponded to 12 inches

*A horizon*
- Value: 2 to 5 dry
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
- Reaction: pH 6.6 to 7.3

*Bg horizon*
- Texture: Loam or sandy loam
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
- Reaction: pH 6.6 to 7.8

*Cg1 horizon*
- Value: 4 or 5 moist; 6 or 7 dry
- Texture: Loam, silt loam, or sandy loam

Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 7.4 to 8.4

*Cg2 and Cg3 horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 moist; 6 or 7 dry
Chroma: 1 to 4 or 6
Texture: Loam, silt loam, sandy clay loam, or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 45 percent—0 to 5 percent cobbles; 0 to 40 percent gravel
Calcium carbonate equivalent: 0 to 15 percent
Reaction: pH 7.4 to 8.4

## *Gregson Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Stream terraces, flood plains, drainageways, and depressions
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 4,600 to 6,000 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aquic Haplustolls

### Typical Pedon

Gregson loam, 0 to 4 percent slopes, in an area of pasture, 2,100 feet south and 3,600 feet west of the northeast corner of sec. 27, T. 4 N., R. 10 W.

Oi—0 to 2 inches; partially decomposed organic matter.
A1—2 to 12 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate fine and medium platy structure; slightly hard, friable, slightly sticky, slightly plastic; few coarse and many very fine, fine, and medium roots; many fine tubular pores; 5 percent gravel; slightly alkaline; gradual smooth boundary.
A2—12 to 17 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate thin platy; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 5 percent gravel; slightly alkaline; clear smooth boundary.
Bw—17 to 31 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; common medium distinct strong brown (7.5YR 5/6) redox concentrations; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common fine tubular pores; 5 percent cobbles; 5 percent gravel; neutral; clear smooth boundary.
2C1—31 to 43 inches; light gray (10YR 7/1) extremely cobbly loamy sand, light brownish gray (10YR 6/2) moist; single grain; loose, nonsticky, nonplastic; few

very fine and fine roots; many very fine and fine interstitial pores; 30 percent cobbles; 40 percent gravel; neutral; clear wavy boundary.

2C2—43 to 60 inches; light gray (10YR 7/1) extremely cobbly loamy sand, gray (10YR 6/1) moist; single grain; loose, nonsticky, nonplastic; many very fine and fine interstitial pores; 30 percent cobbles; 40 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the seasonal high water table:* 24 to 42 inches
*Depth to sand and gravel:* 20 to 40 inches

*A horizons*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Loam or fine sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 6.6 to 7.8

*Bw horizon*
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Fine sandy loam, loam, or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 7.8

*2C horizons*
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 1 to 3
Texture: Loamy sand or sand
Clay content: 0 to 5 percent
Content of rock fragments: 35 to 75 percent—5 to 30 percent cobbles; 30 to 45 percent gravel
Reaction: pH 6.6 to 7.8

## *Hackney Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills
*Parent material:* Residuum or colluvium from semiconsolidated shale
*Slope range:* 4 to 50 percent
*Elevation range:* 5,500 to 6,000 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy, mixed, superactive, frigid, shallow Typic Haplustolls

### Typical Pedon

Hackney loam, in an area of Tewfel-Hackney complex, 4 to 15 percent slopes, in an area of rangeland, 1,900 feet east and 1,600 feet north of the southwest corner of sec. 34, T. 11 N., R. 12 W.; Granite County, Montana.

A1—0 to 3 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine tubular pores; neutral; clear smooth boundary.

A2—3 to 8 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

Bw—8 to 13 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

Cr—13 to 60 inches; semiconsolidated shale.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 15 inches
*Depth to the Cr horizon:* 10 to 20 inches

*A1 horizon*
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 1 to 3
Clay content: 18 to 27 percent
Reaction: pH 6.6 to 7.3

*A2 horizon*
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Reaction: pH 6.6 to 7.3

*Bw horizon*
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 1 or 2
Clay content: 27 to 35 percent
Reaction: pH 6.6 to 7.3

## *Hanson Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountain side slopes
*Parent material:* Colluvium from limestone
*Slope range:* 15 to 60 percent
*Elevation range:* 5,700 to 7,800 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 36 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, carbonatic Calcic Haplocryolls

## Typical Pedon

Hanson gravelly loam, 35 to 60 percent slopes, in an area of rangeland, 750 feet north and 900 feet west of the southeast corner of sec. 14, T. 5 N., R. 12 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine interstitial pores; 15 percent gravel; neutral; gradual wavy boundary.

A2—6 to 12 inches; brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine interstitial pores; 35 percent gravel; slightly alkaline; clear wavy boundary.

Bk1—12 to 17 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine interstitial pores; 10 percent cobbles; 30 percent gravel; common soft masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk2—17 to 26 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine interstitial pores; 15 percent cobbles; 35 percent gravel; disseminated lime; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—26 to 60 inches; light brownish gray (10YR 6/2) very cobbly loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; many fine interstitial pores; 25 percent cobbles; 35 percent gravel; disseminated lime; many fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 16 inches
*Depth to the calcic horizon:* 10 to 16 inches

*A1 horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.8

*A2 horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 15 to 32 percent
Content of rock fragments: 5 to 55 percent—0 to 25 percent stones and cobbles; 5 to 30 percent gravel
Reaction: pH 6.6 to 7.8

*Bk1 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 15 to 25 percent
Content of rock fragments: 35 to 60 percent—10 to 30 percent cobbles; 20 to 30 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.4 to 8.4

*Bk2 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 15 to 32 percent
Content of rock fragments: 35 to 80 percent—15 to 45 percent cobbles; 20 to 35 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.4 to 8.4

*Bk3 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 15 to 32 percent
Content of rock fragments: 35 to 80 percent—15 to 45 percent cobbles; 20 to 35 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.9 to 8.4

## *Helmville Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Slope alluvium and colluvium from limestone
*Slope range:* 2 to 60 percent
*Elevation range:* 5,470 to 8,600 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

### Typical Pedon

Helmville cobbly loam, 15 to 35 percent slopes, in an area of woodland, 900 feet south and 800 feet east of the northwest corner of sec. 35, T. 6 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed organic matter.
E—1 to 12 inches; brown (7.5YR 5/3) cobbly loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, friable, nonsticky, nonplastic; many very fine, fine, and medium roots; many very fine and fine discontinuous irregular pores; 10 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.
Bt1—12 to 20 inches; yellowish brown (10YR 5/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure;

slightly hard, friable, slightly sticky, moderately plastic; few coarse, common medium, and many very fine and fine roots; many very fine and fine discontinuous irregular pores; many faint continuous clay films on faces of peds; 10 percent cobbles; 30 percent gravel; neutral; gradual wavy boundary.

Bt2—20 to 38 inches; brownish yellow (10YR 5/4) very cobbly clay loam; yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine, fine, and medium roots; many very fine and fine discontinuous irregular pores; many faint clay films on faces of peds; 30 percent cobbles; 25 percent gravel; slightly alkaline; clear smooth boundary.

Bk—38 to 60 inches; pale brown (10YR 6/3) very cobbly clay loam; yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine and common medium roots; common very fine and fine discontinuous irregular pores; 30 percent cobbles; 30 percent gravel; disseminated lime; many distinct lime casts on undersides of rock fragments; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 15 to 40 inches

*E horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 20 percent stones and cobbles; 5 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*Bt1 horizon*
Hue: 10YR or 7.5YR
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 4 or 6
Clay content: 27 to 35 percent
Content of rock fragments: 30 to 60 percent—10 to 35 percent stones and cobbles; 15 to 40 percent gravel
Reaction: pH 6.1 to 7.8

*Bt2 horizon*
Hue: 10YR or 7.5YR
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 4 or 6
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—10 to 35 percent stones and cobbles; 15 to 40 percent gravel
Reaction: pH 6.1 to 7.8

*Bk horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 40 to 80 percent—20 to 35 percent cobbles; 20 to 45 percent gravel

Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.4 to 8.4

## *Holloway Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Volcanic ash over colluvium
*Slope range:* 15 to 60 percent
*Elevation range:* 6,000 to 8,720 feet
*Annual precipitation:* 25 to 40 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Eutrocryepts

### Typical Pedon

Holloway gravelly ashy silt loam, 15 to 35 percent slopes, in an area of woodland, 1,600 feet west and 1,800 feet south of the northeast corner of sec. 28, T. 6 N., R. 11 W.

Oi—0 to 3 inches; decomposed and undecomposed forest litter.

A—3 to 12 inches; light yellowish brown (10YR 5/4) gravelly ashy silt loam; dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; common very fine and fine irregular pores; 5 percent cobbles; 20 percent gravel; strongly acid; clear smooth boundary.

2E—12 to 28 inches; light gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; common very fine and fine irregular pores; 15 percent cobbles; 55 percent gravel; slightly acid; gradual smooth boundary.

2E and Bt—28 to 56 inches; E part (75 percent) pinkish gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 5/3) moist; B part (25 percent) is brown (7.5YR 5/2) fine sandy loam lamellae $^1/_8$- to $^1/_2$-inch thick, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common very fine and fine irregular pores; 15 percent cobbles; 55 percent gravel; slightly acid; gradual smooth boundary.

2C—56 to 60 inches; light yellowish brown (2.5Y 6/3) extremely gravelly sandy loam, light olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine irregular pores; 15 percent cobbles; 55 percent gravel; slightly acid.

### Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 8 and 24 inches

A horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry: 4 or 5 moist
Chroma: 4 or 6
Clay content: 5 to 15 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Glass content: 5 to 10 percent
Acid-oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Moist bulk density: 1 g/cm$^3$ or less
Reaction: pH 5.1 to 6.5

*2E horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry: 5 or 6 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 45 to 75 percent—0 to 15 percent cobbles; 45 to 60 percent gravel
Reaction: pH 5.1 to 6.5

*2E and Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry; 5 or 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: E part: 2 or 3; B part: 2 to 4
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent; lamellae has less than 3 percent clay increase
Content of rock fragments: 60 to 80 percent—5 to 15 percent cobbles; 55 to 70 percent gravel
Reaction: pH 5.1 to 6.5

*2C horizon*
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or loamy sand
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 80 percent—5 to 20 percent cobbles; 55 to 70 percent gravel
Reaction: pH 5.1 to 6.5

## *Illiano Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Residuum from welded tuff or rhyolite
*Slope range:* 15 to 70 percent
*Elevation range:* 5,400 to 7,800 feet
*Annual precipitation:* 18 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy-skeletal, glassy Lithic Eutrocryepts

### Typical Pedon

Illiano very flaggy ashy sandy loam, in an area of Karloff-Coslaw-Illiano association, 35 to 70 percent slopes, moderately impacted, in an area of nonstocked forest, 100 feet east and 2,350 feet north of the southwest corner of sec. 14, T. 3 N., R. 11 W.

A—0 to 4 inches; grayish brown (10YR 5/2) very flaggy ashy sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; 25 percent flagstones; 30 percent gravel; slightly acid; clear wavy boundary.

Bw—4 to 11 inches; light brownish gray (10YR 6/2) very flaggy ashy sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; 25 percent flagstones; 30 percent gravel; neutral; abrupt smooth boundary.

R—11 inches; light gray (5Y 7/1) fractured hard welded tuff bedrock.

### Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 8 inches and the lithic contact
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to bedrock:* 10 to 20 inches

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 4 or 5 dry; 3 or 4 moist
- Chroma: 1 or 2
- Clay content: 10 to 20 percent
- Content of rock fragments: 35 to 60 percent—15 to 25 percent flagstones; 20 to 35 percent gravel
- Reaction: pH 5.6 to 6.5

*Bw horizon*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 1 to 3
- Texture: Ashy loam, ashy sandy loam, or ashy coarse sandy loam
- Clay content: 5 to 18 percent
- Content of rock fragments: 35 to 60 percent—15 to 25 percent flagstones; 20 to 35 percent gravel
- Reaction: pH 5.6 to 7.3

## *Judco Series*

*Depth class:* Deep (40 to 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, hills, and mountains
*Parent material:* Colluvium and residuum from welded tuff or rhyolite
*Slope range:* 15 to 70 percent
*Elevation range:* 5,300 to 7,600 feet
*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Vitrandic Eutrocryepts

## Typical Pedon

Judco very gravelly ashy sandy loam, in an area of Karloff-Judco-Illiano complex, 35 to 70 percent slopes, in an area of forestland, 400 feet east and 2,100 feet south of the northwest corner of sec. 14, T. 3 N., R. 11 W.

Oi—0 to 1/2 inch; partially decomposed needles, twigs, and leaves.
Oe—1/2 to 2 inches; well decomposed needles, twigs, and leaves.
A1—2 to 4 inches; dark gray (10YR 4/1) very gravelly ashy sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; 10 percent cobbles; 30 percent gravel; strongly acid; clear wavy boundary.
A2—4 to 6 inches; gray (10YR 5/1) very gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine tubular pores; 10 percent cobbles; 30 percent gravel; moderately acid; clear wavy boundary.
Bw—6 to 12 inches; yellowish brown (10YR 5/4) very gravelly ashy sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine tubular pores; 10 percent cobbles; 30 percent gravel; moderately acid; clear wavy boundary.
BC1—12 to 23 inches; light gray (2.5Y 7/2) very gravelly ashy sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine tubular pores; 10 percent cobbles; 45 percent gravel; slightly acid; gradual wavy boundary.
BC2—23 to 40 inches; light gray (2.5Y 7/2) very gravelly ashy sandy clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; few medium and common very fine and fine roots; common fine tubular pores; 5 percent cobbles; 45 percent gravel; neutral; gradual wavy boundary.
C—40 to 58 inches; light gray (10YR 7/2) very gravelly ashy sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; few very fine, fine, and medium roots; 5 percent cobbles; 45 percent gravel; neutral; clear wavy boundary.
Cr—58 to 60 inches; light gray (10YR 7/2) decomposing welded tuff bedrock that crushes to very gravelly ashy sandy loam; neutral.

## Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 20 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the Cr horizon:* 50 to 60 inches

*A1 horizon*
Hue: 10YR or 2.5Y
Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2
Texture: Ashy sandy loam or ashy sandy clay loam
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 60 percent—0 to 30 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 6.5

*A2 horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 1 or 2
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent stones and cobbles; 30 to 45 percent gravel
Reaction: pH 5.1 to 6.5

*Bw horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 55 percent—5 to 15 percent stones and cobbles; 30 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*BC and C horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 or 2
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 15 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent stones and cobbles; 30 to 45 percent gravel
Reaction: pH 5.6 to 7.3

## *Julius Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 5,180 to 6,200 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid Alfic Argiustolls

### Typical Pedon

Julius loam, 4 to 8 percent slopes, in an area of hayland, 2,800 feet west and 1,800 feet south of the northeast corner of sec. 34, T. 6 N., R. 14 W.; Granite County, Montana.

Ap1—0 to 4 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many very fine tubular pores; neutral; clear wavy boundary.

Ap2—4 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine tubular pores; neutral; clear wavy boundary.

Bt/E—8 to 11 inches; B part (65 percent) is brown (7.5YR 5/4) clay loam, dark brown (10YR 4/4) moist; E part (35 percent) is pinkish gray (7.5YR 6/2) loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bt1—11 to 17 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong medium columnar structure; very hard, very firm, very sticky, very plastic; common fine and medium roots; few very fine tubular pores; many distinct clay films on faces of peds; strongly alkaline; clear wavy boundary.

Bt2—17 to 23 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure; hard, firm, moderately sticky, moderately plastic; common fine and medium and many very fine roots; common very fine tubular pores; common faint clay films on faces of peds; slightly alkaline; abrupt wavy boundary.

Bk—23 to 33 inches; very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common fine tubular pores; disseminated lime; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—33 to 60 inches; very pale brown (10YR 8/4) semiconsolidated tuff.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 12 inches
*Depth to the calcic horizon:* 19 to 32 inches
*Depth to the Cr horizon:* 20 to 40 inches

*Ap horizons*

Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel
Reaction: pH 6.6 to 7.3

*Bt/E horizon*

Hue: 7.5YR or 10YR
Value: B part: 4 or 5 dry; 3 or 4 moist; E part: 5 or 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam (mixed)
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.6 to 7.8

*Bt1 horizon*
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or clay loam
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 7.9 to 9.0

*Bt2 horizon*
Hue: 7.5YR or 10YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Clay or clay loam
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 7.4 to 8.4

*Bk horizon*
Hue: 7.5YR or 10YR
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Clay loam or loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.6

## *Karloff Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium and residuum from welded tuff or rhyolite
*Slope range:* 4 to 70 percent
*Elevation range:* 5,200 to 8,000 feet
*Annual precipitation:* 18 to 30 inches
*Annual air temperature:* 30 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy-skeletal, glassy Vitrandic Eutrocryepts

### Typical Pedon

The Karloff soil in map unit 865F is a taxadjunct to the Series. It classifies as Loamy-skeletal, mixed, superactive, frigid Vitrandic Haplustepts.

### Typical Pedon

Karloff very cobbly ashy sandy loam, in an area of Elve, stony-Karloff-Worock complex, 4 to 15 percent slopes, in an area of forestland, 950 feet south and 1,000 feet west of the northeast corner of sec. 13, T. 3 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.

A—1 to 3 inches; dark gray (10YR 4/1) very cobbly ashy sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; 15 percent cobbles; 25 percent gravel; neutral; clear wavy boundary.

E—3 to 9 inches; light brownish gray (2.5Y 6/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; slightly hard, very friable, nonsticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine tubular pores; 20 percent gravel; moderately acid; clear wavy boundary.

Bw—9 to 16 inches; light gray (2.5Y 7/2) very gravelly ashy sandy loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine tubular pores; 5 percent cobbles; 35 percent gravel; slightly acid; clear wavy boundary.

BC—16 to 27 inches; light gray (2.5Y 7/2) very gravelly ashy sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine tubular pores; 10 percent cobbles; 40 percent gravel; slightly acid; gradual wavy boundary.

Cr—27 to 35 inches; light gray (5Y 7/1) decomposing welded tuff bedrock that crushes to very gravelly ashy sandy loam; neutral.

R—35 inches; light gray (5Y 7/1) hard fractured welded tuff bedrock.

## Range in Characteristics

*Mean annual soil temperature:* 32 to 40 degrees F
*Mean summer soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 8 and 24 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Surface fragments:* 0 to 0.1 percent stones
*Depth to the Cr horizon:* 20 to 38 inches
*Depth to bedrock:* 25 to 40 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Ashy sandy loam or ashy loam
Clay content: 10 to 20 percent
Content of rock fragments: 15 to 45 percent—0 to 15 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*E horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Ashy sandy loam, ashy loam, or ashy loamy sand
Clay content: 5 to 18 percent
Content of rock fragments: 15 to 45 percent—0 to 15 percent stones and cobbles; 15 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*Bw and BC horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 or 2
Texture: Ashy coarse sandy loam, ashy sandy loam, or ashy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent stones and cobbles; 30 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Kilgore Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 29 inches, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,740 to 8,800 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Cumulic Cryaquolls

### Typical Pedon

Kilgore loam, in an area of Kilgore-Mooseflat complex, 0 to 2 percent slopes, in an area of pasture, 300 feet east and 1,950 feet south of the northwest corner of sec. 8, T. 1 S., R. 14 W.

Oe—0 to 2 inches; decomposed organic mat.
A1—2 to 4 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine and common very fine tubular pores; neutral; clear smooth boundary.
A2—4 to 10 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; common medium prominent dark yellowish brown (10YR 3/4) redox concentrations; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.
A3—10 to 15 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear wavy boundary.
C1—15 to 27 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine tubular pores; neutral; clear wavy boundary.
C2—27 to 31 inches; dark grayish brown (10YR 4/2) fine sandy loam, grayish brown (10YR 5/2) dry; common fine dark grey (10YR 4/1) moist redox depletions; massive; soft, friable, slightly sticky, nonplastic; few fine and common very fine roots; common very fine and fine tubular pores; neutral; clear wavy boundary.
2C3—31 to 60 inches; brown (10YR 5/3) very gravelly sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; common irregular pores; 5 percent cobbles; 40 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 20 to 34 inches
*Depth to the seasonal high water table:* 0 to 12 inches
*Depth to the 2C3 horizon:* 20 to 40 inches

*A horizons*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 18 to 27 percent
Reaction: pH 6.1 to 7.3

*C1 horizon*
Value: 4 or 5 dry
Chroma: 1 or 2
Texture: Loam, fine sandy loam, or clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.1 to 7.3

*C2 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Loam, fine sandy loam, or clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.1 to 7.3

*2C3 horizon*
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Loamy sand or sand
Clay content: 5 to 15 percent
Content of rock fragments: 40 to 60 percent—0 to 20 percent cobbles; 0 to 40 percent gravel
Reaction: pH 6.1 to 7.3

## *Kleinschmidt Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, stream terraces, and flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Oxyaquic Haplustolls

### Typical Pedon

Kleinschmidt gravelly loam, cool, 0 to 4 percent slopes, in an area of hayland, 2,600 feet south and 2,200 feet west of the northeast corner of sec. 34, T. 14 N., R. 11 W.; Powell County, Montana.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and moderately plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 25 percent gravel; neutral; abrupt smooth boundary.

A—7 to 14 inches; dark grayish brown (10YR 4/2) very gravelly loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and moderately plastic; few medium and many very fine and fine roots; many very fine and fine tubular pores; 5 percent cobbles; 30 percent gravel; neutral; clear smooth boundary.

Bw1—14 to 28 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, medium, and coarse and many fine roots; many very fine and fine tubular pores; 5 percent cobbles; 40 percent gravel; slightly alkaline; gradual wavy boundary.

Bw2—28 to 37 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; few fine distinct reddish yellow (7.5YR 6/6) redox concentrations; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few coarse, common very fine, and many fine roots; many very fine and fine tubular pores; 10 percent cobbles; 40 percent gravel; few thin lime casts on undersides of coarse fragments; slightly alkaline; clear wavy boundary.

2Bk—37 to 60 inches; brown (10YR 5/3) extremely cobbly loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 35 percent cobbles; 35 percent gravel; disseminated lime; slightly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the seasonal high water table:* 24 to 42 inches
*Depth to the 2Bk horizon:* 30 to 48 inches

Ap horizon
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 15 to 25 percent
- Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel
- Reaction: pH 6.6 to 7.8

*A horizon*
- Hue: 10YR or 7.5YR
- Value: 4 or 5 dry; 2 to 4 moist
- Chroma: 1 or 2
- Clay content: 15 to 25 percent
- Content of rock fragments: 20 to 50 percent—0 to 20 percent cobbles; 20 to 30 percent gravel
- Reaction: pH 6.6 to 7.8

*Bw horizons*
- Value: 4 to 7 dry; 2 to 5 moist
- Chroma: 2 to 4
- Texture: Loam, sandy loam, or silty clay loam
- Clay content: 15 to 35 percent

Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent gravel
Reaction: pH 6.6 to 8.4

*2Bk horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 3 to 5 moist
Chroma: 1 to 4 or 6
Texture: Sandy loam, loamy sand, or sand
Clay content: 5 to 10 percent
Content of rock fragments: 40 to 85 percent—15 to 35 percent cobbles; 25 to 50 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

## *Lap Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Residuum from limestone
*Slope range:* 4 to 60 percent
*Elevation range:* 5,300 to 6,200 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid Lithic Calciustolls

### Typical Pedon

Lap gravelly loam, in an area of Windham-Lap gravelly loams, 15 to 35 percent slopes, in an area of rangeland, 1,700 feet north and 500 feet east of the southwest corner of sec. 12, T. 10 N., R. 7 W.; Powell County, Montana.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, nonsticky, slightly plastic; common coarse and many very fine, fine, and medium roots; many very fine interstitial pores; 5 percent stones; 10 percent cobbles; 20 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

A2—4 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; common coarse and many very fine, fine, and medium roots; many very fine interstitial pores; 5 percent stones; 5 percent cobbles; 15 percent gravel; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bk1—9 to 14 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few coarse and common very fine, fine, and medium roots; common very fine interstitial pores; 5 percent stones; 15 percent cobbles; 35 percent gravel; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—14 to 18 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few very fine, fine, and medium roots; common very fine

interstitial pores; 5 percent stones; 25 percent cobbles; 30 percent gravel; disseminated lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

R—18 inches; fractured limestone bedrock.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 10 inches
*Clay content:* 20 to 27 percent
*Surface fragments:* 0 to 3 percent stones
*Depth to bedrock:* 10 to 20 inches

*A horizons*
Clay content: 20 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 10 percent cobbles; 10 to 20 percent gravel
Reaction: pH 7.4 to 7.8

*Bk1 horizon*
Clay content: 20 to 27 percent
Content of rock fragments: 40 to 70 percent—5 to 10 percent stones; 15 to 20 percent cobbles; 30 to 40 percent gravel
Reaction: pH 7.9 to 8.4
Calcium carbonate equivalent: 30 to 40 percent

*Bk2 horizon*
Clay content: 20 to 27 percent
Content of rock fragments: 50 to 70 percent—5 to 10 percent stones; 20 to 25 percent cobbles; 25 to 35 percent gravel
Reaction: pH 7.9 to 8.4
Calcium carbonate equivalent: 40 to 50 percent

## *Levengood Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Slope alluvium over colluvium from limestone
*Slope range:* 4 to 60 percent
*Elevation range:* 5,800 to 7,800 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Calcic Pachic Haplocryolls

### Typical Pedon

Levengood gravelly loam, in an area of Tibson-Levengood gravelly loams, 15 to 35 percent slopes, in an area of rangeland, 2,100 feet east and 400 feet south of the northwest corner of sec. 19, T. 6 N., R. 14 W.; Granite County, Montana.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) gravelly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common fine interstitial pores; 5 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

Bw—6 to 12 inches; brown (10YR 5/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 5 percent cobbles; 30 percent gravel; neutral; clear smooth boundary.

Bk1—12 to 19 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; 10 percent cobbles; 35 percent gravel; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—19 to 30 inches; pale yellow (2.5Y 7/4) very gravelly fine sandy loam, light yellowish brown (2.5Y 6/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 10 percent cobbles; 35 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—30 to 60 inches; very pale brown (10YR 7/4) very cobbly loam, light yellowish brown (10YR 6/4) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; few very fine roots; 25 percent cobbles; 20 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 16 to 30 inches
*Depth to the calcic horizon:* 12 to 18 inches

*A horizon*
- Value: 3 or 4 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 15 to 30 percent—0 to 5 percent cobbles; 15 to 25 percent gravel
- Reaction: pH 6.6 to 7.3

*Bw horizon*
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 to 3
- Texture: Clay loam or loam
- Clay content: 18 to 30 percent
- Content of rock fragments: 35 to 55 percent—5 to 15 percent cobbles; 30 to 40 percent gravel
- Reaction: pH 6.6 to 7.3

*Bk1 horizon*
- Value: 4 or 5 dry; 3 or 4 moist
- Chroma: 1 to 3
- Texture: Clay loam or loam
- Clay content: 18 to 30 percent
- Content of rock fragments: 35 to 50 percent—5 to 10 percent cobbles; 30 to 40 percent gravel
- Calcium carbonate equivalent: 15 to 40 percent
- Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Clay loam, loam, or fine sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 50 percent—5 to 10 percent cobbles; 30 to 40 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

*Bk3 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Clay loam, loam, or sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles; 20 to 30 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

## *Liart Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* High mountain valleys and flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 5,500 to 7,500 feet
*Annual precipitation:* 15 to 25 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Ashy, glassy Aquandic Cryaquolls

### Typical Pedon

Liart mucky silt loam, in an area of Liart-Mooseflat-Tibkey complex, 0 to 4 percent slopes, moderately impacted, in an area of rangeland, 2,500 feet north and 1,900 feet east of the southwest corner of sec. 16, T. 3 N., R. 11 W.

Oe—0 to 2 inches; very dark grayish brown (10YR 3/2) mucky silt loam, dark gray (10YR 4/1) dry; strongly acid.

A1—2 to 18 inches; black (10YR 2/1) ashy loam, dark gray (10YR 4/1) dry; moderate coarse angular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; 5 percent gravel; many very fine roots; moderately acid; clear wavy boundary.

A2g—18 to 33 inches; very dark brown (10YR 2/2) ashy sandy clay loam, gray (10YR 5/1) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; 5 percent gravel; slightly acid; gradual wavy boundary.

ACg—33 to 40 inches; very dark gray (10YR 3/1) gravelly ashy coarse sandy loam, gray (10YR 5/1) dry; moderate coarse prismatic structure; hard, friable, slightly sticky, nonplastic; 20 percent gravel; slightly acid; gradual wavy boundary.

Cg1—40 to 46 inches; very dark gray (5Y 3/1) stratified ashy silt loam and ashy coarse sandy loam, gray (2.5Y 5/1) dry; massive; hard, friable, slightly sticky, slightly plastic; 5 percent gravel; slightly acid; gradual wavy boundary.

Cg2—46 to 60 inches; olive (5Y 5/3) gravelly ashy coarse sandy loam, gray (2.5Y 5/1) dry; massive; hard, friable, nonsticky, nonplastic; 5 percent cobbles; 20 percent gravel; slightly acid.

## Range in Characteristics

*Mean annual soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the seasonal high water table:* 0 to 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Thickness of the mollic epipedon:* 20 to 47 inches

*A1 horizon*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Mucky silt loam, ashy loam, or ashy silt loam
Clay content: 15 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 5.6 to 6.5

*A2g horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Ashy sandy clay loam, ashy clay loam, or ashy loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 5.6 to 6.5

*ACg horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Ashy coarse sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 5.6 to 6.5

*Cg1 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Stratified ashy coarse sandy loam, ashy silt loam, or ashy loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 5.6 to 6.5

*Cg2 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Ashy coarse sandy loam, ashy silt loam, or ashy loam

Clay content: 18 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 5.6 to 6.5

## *Libeg Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, stream terraces, and hills
*Parent material:* Colluvium
*Slope range:* 2 to 85 percent
*Elevation range:* 5,200 to 8,400 feet
*Annual precipitation:* 15 to 30 inches
*Annual air temperature:* 34 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Argicryolls

### Typical Pedon

Libeg gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 800 feet west and 200 feet south of the northeast corner of sec. 29, T. 3 N., R. 11 W.

A—0 to 8 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 5 percent cobbles; 20 percent gravel; moderately acid; clear smooth boundary.

Bt1—8 to 16 inches; light brownish gray (10YR 6/2) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 30 percent gravel; slightly acid; gradual wavy boundary.

Bt2—16 to 30 inches; pale brown (10YR 6/3) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, slightly sticky, moderately plastic; common very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 35 percent gravel; neutral; gradual wavy boundary.

C—30 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky, moderately plastic; few very fine and fine roots; common very fine and fine interstitial pores; 15 percent cobbles; 30 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Surface fragments:* 0 to 3 percent stones

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 to 3
Clay content: 10 to 27 percent

Content of rock fragments: 15 to 60 percent—0 to 50 percent cobbles; 15 to 50 percent gravel
Reaction: pH 5.6 to 7.3

*Bt horizons*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 15 to 35 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 7.3

*C horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 7.3

## *Litag Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, mountains, and hills
*Parent material:* Residuum and colluvium from welded tuff or rhyolite
*Slope range:* 4 to 60 percent
*Elevation range:* 5,200 to 6,400 feet
*Annual precipitation:* 18 to 24 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy-skeletal, glassy, frigid Vitrandic Haplustepts

### Typical Pedon

Litag mucky loam, in an area of Pax-Nivean-Litag complex, 35 to 60 percent slopes, moderately impacted, in an area of forestland, 1,450 feet west and 2,500 feet north of the southeast corner of sec. 35, T. 4 N., R. 11 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.
A—1 to 3 inches; very dark gray (10YR 3/1) mucky loam, black (10YR 2/1) moist; weak very fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; 5 percent gravel; neutral; clear wavy boundary.
E1—3 to 9 inches; light brownish gray (2.5Y 6/2) gravelly ashy sandy clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; many medium tubular pores; 5 percent cobbles; 20 percent gravel; neutral; clear wavy boundary.
E2—9 to 20 inches; light brownish gray (2.5Y 6/2) gravelly ashy sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky

structure; slightly hard, very friable, slightly sticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; many medium tubular pores; 5 percent cobbles; 25 percent gravel; neutral; gradual wavy boundary.

Bw—20 to 35 inches; light brownish gray (2.5Y 6/2) very gravelly ashy sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, nonplastic; few coarse, common medium, and many very fine and fine roots; many medium tubular pores; 10 percent cobbles; 30 percent gravel; slightly acid; gradual wavy boundary.

BC—35 to 54 inches; grayish brown (2.5Y 5/2) very gravelly ashy sandy clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and many very fine and fine roots; common medium tubular pores; 10 percent cobbles; 35 percent gravel; slightly acid; gradual irregular boundary.

C—54 to 60 inches; light yellowish brown (2.5Y 6/4) very cobbly ashy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; few medium and coarse and many very fine and fine roots; common medium tubular pores; 20 percent cobbles; 30 percent gravel; slightly acid.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent.

*A horizon*
- Hue: 10YR or 2.5Y
- Value: 3 or 4 dry; 2 or 3 moist
- Chroma: 1 or 2
- Texture: Mucky loam, ashy sandy loam, or ashy sandy clay loam
- Clay content: 18 to 25 percent
- Content of rock fragments: 5 to 25 percent—0 to 5 percent stones and cobbles; 5 to 20 percent gravel
- Reaction: pH 5.6 to 7.3

*E horizons*
- Hue: 10YR or 2.5Y
- Value: 5 or 6 dry; 3 to 5 moist
- Chroma: 2 or 3
- Texture: Ashy sandy loam or ashy sandy clay loam
- Clay content: 18 to 27 percent
- Content of rock fragments: 15 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent gravel
- Reaction: pH 5.6 to 7.3

*Bw horizon*
- Hue: 10YR or 2.5Y
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Ashy loam or ashy sandy clay loam
- Clay content: 18 to 27 percent
- Content of rock fragments: 35 to 60 percent—5 to 20 percent stones and cobbles; 30 to 40 percent gravel
- Reaction: pH 5.6 to 7.3

*BC horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent stones and cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 7.3

*C horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 1 to 4
Texture: Ashy sandy loam, ashy loam, or ashy sandy clay loam
Clay content: 12 to 25 percent
Content of rock fragments: 35 to 60 percent—10 to 40 percent stones and cobbles; 15 to 50 percent gravel
Reaction: pH 5.6 to 7.3

## *Loberg Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Mountains
*Parent material:* Colluvium
*Slope range:* 4 to 60 percent
*Elevation range:* 5,000 to 8,100 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive Ustic Glossocryalfs

### Typical Pedon

Loberg gravelly loam, 15 to 35 percent slopes, in an area of woodland, 1,200 feet south and 200 feet east of the northwest corner of sec. 36, T. 6 N., R. 11 W.

Oi—0 to 1 inch; undecomposed needles and twigs.
Oe—1 to 3 inches; partially decomposed forest litter.
E—3 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many fine irregular pores; 5 percent cobbles; 15 percent gravel; moderately acid; clear wavy boundary.
E/Bt—6 to 21 inches; E part (75 percent) is light brownish gray (10YR 6/2) very gravelly clay loam, dark grayish brown (10YR 4/2) moist tongues; B part (25 percent) is pale brown (10YR 6/3) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine and fine and common medium and coarse roots; common very fine, fine, and medium tubular pores; 15 percent cobbles; 30 percent gravel; slightly acid; clear wavy boundary.
Bt1—21 to 28 inches; brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, moderately

sticky, moderately plastic; few medium and coarse, common fine, and many very fine roots; common very fine and fine tubular pores; continuous faint clay films on faces of peds; 15 percent cobbles; 30 percent gravel; slightly acid; clear wavy boundary.

Bt2—28 to 38 inches; pale brown (10YR 6/3) very cobbly clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few coarse and common very fine, fine, and medium roots; common very fine tubular pores; continuous faint clay films on faces of peds; 20 percent cobbles; 35 percent gravel; slightly acid; gradual wavy boundary.

BC—38 to 60 inches; pale brown (10YR 6/3) very cobbly clay loam; brown (10YR 5/3) moist; weak coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; few fine and common very fine tubular pores; 20 percent cobbles; 35 percent gravel; slightly acid.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches

*E horizon*
Hue: 10YR or 7.5YR
Value: 4 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 10 to 60 percent—0 to 20 percent cobbles; 10 to 45 percent gravel
Reaction: pH 5.6 to 7.3

*E/Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 5 to 7 dry; 3 to 5 moist; B part: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent (mixed)
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*Bt horizons*
Hue: 10YR or 7.5YR
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4 or 6
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent stones and cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.8

*BC horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Clay loam or clay
Clay content: 35 to 45 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 30 to 40 percent gravel
Reaction: pH 6.1 to 7.8

## *Lolon Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Excessively drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 28 inches, rapid (6 to 20 inches/hour) below
*Landform:* Glacial moraines and alluvial fans
*Parent material:* Alluvium
*Slope range:* 4 to 25 percent
*Elevation range:* 5,200 to 6,300 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Pachic Haplocryolls

### Typical Pedon

Lolon gravelly loam, 4 to 25 percent slopes, in an area of rangeland, 500 feet west and 300 feet south of the northeast corner of sec. 26, T. 1 N., R. 15 W.

A1—0 to 4 inches; very dark brown (10YR 2/2) gravelly loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 1 percent boulders; 5 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

A2—4 to 12 inches; very dark brown (10YR 2/2) gravelly loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine tubular pores; 1 percent boulders; 5 percent cobbles; 20 percent gravel; neutral; clear wavy boundary.

Bw—12 to 17 inches; dark brown (10YR 3/3) cobbly loam, dark brown (10YR 4/3) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common fine and medium tubular pores; 1 percent boulders; 15 percent cobbles; 20 percent gravel; neutral; clear wavy boundary.

BC—17 to 27 inches; brown (10YR 5/3) very cobbly loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common fine tubular pores; 1 percent boulders; 15 percent cobbles; 25 percent gravel; neutral; clear wavy boundary.

2C—27 to 60 inches; pale brown (10YR 6/3) very cobbly sand, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few fine and medium and common very fine roots; common very fine interstitial pores; 1 percent boulders; 20 percent cobbles; 20 percent gravel; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* 17 to 24 inches
*Surface fragments:* 0 to 0.1 percent boulders
*Note:* The particle-size control section has more than 50 percent fine sand or coarser.

*A horizons*
Value: 3 or 4 dry
Chroma: 1 to 3
Clay content: 20 to 25 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent boulders; 5 to 15 percent cobbles; 10 to 20 percent gravel
Reaction: pH 6.1 to 7.3

*Bw horizon*
Value: 3 or 4 moist; 4 or 5 dry
Chroma: 2 or 3
Clay content: 20 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent boulders; 20 to 35 percent cobbles; 15 to 25 percent gravel
Reaction: pH 6.1 to 7.8

*BC horizon*
Chroma: 2 or 3
Clay content: 20 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent boulders; 20 to 35 percent cobbles; 15 to 25 percent gravel
Reaction: pH 6.1 to 7.8

*2C horizon*
Value: 5 or 6 moist; 6 or 7 dry
Chroma: 2 or 3
Clay content: 0 to 5 percent
Content of rock fragments: 35 to 70 percent—0 to 5 percent boulders; 20 to 35 percent cobbles; 15 to 35 percent gravel
Reaction: pH 6.1 to 7.8

## *Lowland Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills and mountains
*Parent material:* Colluvium from tuffaceous volcanic rocks
*Slope range:* 4 to 15 percent
*Elevation range:* 6,600 to 7,000 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Vitrandic Haplocryolls

### Typical Pedon

Lowland ashy loam, in an area of Elve-Worock-Lowland complex, 4 to 15 percent slopes, 100 feet west and 500 feet north of the southeast corner of sec. 15, T. 3 N., R. 11 W.

A1—0 to 6 inches; dark gray (10YR 4/1) ashy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid; clear wavy boundary.

A2—6 to 13 inches; gray (10YR 5/1) ashy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid; gradual wavy boundary.

Bw1—13 to 21 inches; light brownish gray (10YR 6/2) very cobbly ashy loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 20 percent cobbles; 25 percent gravel; neutral; gradual wavy boundary.

Bw2—21 to 29 inches; pale brown (10YR 6/3) very cobbly ashy sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; 20 percent cobbles; 20 percent gravel; neutral; gradual irregular boundary.

BC—29 to 42 inches; light brownish gray (10YR 6/2) very gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine interstitial pores; 10 percent cobbles; 35 percent gravel; neutral; gradual irregular boundary.

C—42 to 60 inches; light yellowish brown (2.5Y 6/3) very cobbly ashy sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 20 percent cobbles; 25 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the mollic epipedon:* 8 to 16 inches
*Volcanic glass:* 25 to 30 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.11 to 0.20 percent

*A horizons*
- Hue: 10YR or 2.5Y
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 15 to 23 percent
- Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent gravel
- Reaction: pH 6.1 to 7.3

*Bw horizons*
- Hue: 10YR or 2.5Y
- Value: 5 or 6 dry; 3 to 5 moist
- Chroma: 1 to 3
- Texture: Ashy loam, ashy sandy clay loam, ashy sandy loam, or ashy coarse sandy loam
- Clay content: 12 to 23 percent
- Content of rock fragments: 25 to 50 percent—5 to 20 percent stones and cobbles; 20 to 30 percent gravel
- Reaction: pH 6.1 to 7.3

*BC horizon*
- Hue: 10YR or 2.5Y
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 1 or 2
- Texture: Ashy loam, ashy sandy loam, or ashy coarse sandy loam

Clay content: 12 to 20 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent stones and cobbles; 25 to 35 percent gravel
Reaction: pH 6.1 to 7.8

*C horizon*
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Ashy coarse sandy loam, ashy sandy loam, ashy loam, or ashy loamy sand
Clay content: 5 to 18 percent
Content of rock fragments: 35 to 60 percent—10 to 40 percent stones and cobbles; 15 to 50 percent gravel
Reaction: pH 6.1 to 7.8

## *Macabre Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Residuum and colluvium from welded tuff or rhyolite
*Slope range:* 8 to 60 percent
*Elevation range:* 5,200 to 6,600 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Argiustolls

### Typical Pedon

Macabre very cobbly ashy sandy clay loam, in an area of Macabre-Nivean-Rock outcrop complex, 15 to 45 percent slopes, moderately impacted, in an area of nonstocked forest, 1,300 feet west and 1,800 feet south of the northeast corner of sec. 35, T. 4 N., R. 11 W.

A—0 to 9 inches; gray (10YR 5/1) very cobbly ashy sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; 15 percent cobbles; 25 percent gravel; slightly alkaline; clear wavy boundary.

Bt—9 to 17 inches; grayish brown (2.5Y 5/2) very cobbly ashy sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; many medium tubular pores; common distinct clay films on faces of peds; 15 percent cobbles; 25 percent gravel; slightly alkaline; gradual wavy boundary.

BC—17 to 27 inches; light brownish gray (2.5Y 6/2) very cobbly ashy sandy clay loam, light olive brown (2.5Y 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and many very fine and fine roots; common medium tubular pores; 20 percent cobbles; 25 percent gravel; slightly alkaline; gradual irregular boundary.

Cr—27 to 41 inches; light gray (N 7/) decomposing welded tuff bedrock.
R—41 inches; light gray (5Y 7/1) fractured hard welded tuff bedrock.

### Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 6 and 18 inches
*Volcanic glass:* 23 to 30 percent in the coarse silt and sand fraction of one or more horizons within 30 inches
*Acid oxalate extractable Fe + Al:* 0.11 to 0.20 percent
*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the argillic horizon:* 6 to 12 inches
*Depth to the Cr horizon:* 20 to 40 inches
*Depth to bedrock:* 40 to 60 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture: Ashy loam or ashy sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent gravel
Reaction: pH 6.1 to 7.8

*Bt horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Ashy loam, ashy clay loam, or ashy sandy clay loam
Clay content: 23 to 30 percent
Content of rock fragments: 35 to 60 percent—5 to 25 percent stones and cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 7.8

*BC horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 1 to 4
Texture: Ashy loam, ashy sandy loam, or ashy sandy clay loam
Clay content: 15 to 25 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent stones and cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 7.8

## *Maciver Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, hills, and mountains
*Parent material:* Colluvium or slope alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 5,400 to 7,200 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Argicryolls

## Typical Pedon

Maciver gravelly loam, 8 to 15 percent slopes, moderately impacted, in an area of rangeland, 2,100 feet west and 950 feet south of the northeast corner of sec. 10, T. 4 N., R. 11 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, moderately plastic; common fine and medium roots; common fine irregular pores; common faint organic films on faces of peds; 30 percent gravel; very strongly acid; clear wavy boundary.

A2—4 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular structure; slightly hard, very friable, slightly sticky, moderately plastic; few coarse and many fine and medium roots; common fine tubular pores; common faint organic films on faces of peds; 30 percent gravel; neutral; clear wavy boundary.

Bt—9 to 23 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few medium and coarse and common very fine and fine roots; common fine tubular pores; many faint clay films on faces of peds; 5 percent cobbles; 50 percent gravel; neutral; clear wavy boundary.

Bk1—23 to 35 inches; very pale brown (10YR 7/3) very gravelly clay loam, light yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; few medium and common fine roots; many very fine tubular pores; 5 percent cobbles; 45 percent gravel; many medium masses of lime and many distinct lime casts on coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—35 to 60 inches; very pale brown (10YR 7/4) very gravelly clay loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine and medium roots; many very fine tubular pores; 5 percent cobbles; 45 percent gravel; many medium masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the Bk horizon:* 11 to 24 inches
*Note:* The surface has a 1/4- to 1/2-inch gravel lag in some pedons.

*A horizons*
- Value: 3 or 4 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel
- Reaction: pH 4.5 to 7.3

*Bt horizon*
- Value: 4 to 6 dry: 3 to 5 moist
- Chroma: 2 to 4
- Clay content: 27 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel
Reaction: pH 6.6 to 7.3

*Bk horizons*
Hue: 2.5Y or 10YR
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 40 to 60 percent—5 to 15 percent cobbles; 35 to 45 percent gravel
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

## *Mannixlee Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Stream terraces, flood plains, and depressions
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,600 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Cumulic Endoaquolls

### Typical Pedon

Mannixlee clay loam, 0 to 2 percent slopes, in an area of pasture, 1,100 feet north and 300 feet east of the southwest corner of sec. 28, T. 10 N., R. 13 W.; Granite County, Montana.

A1—0 to 7 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; common medium distinct dark brown (7.5YR 4/4) redox concentrations; moderate medium granular structure; hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine tubular and discontinuous irregular pores; neutral; gradual smooth boundary.

A2—7 to 14 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine tubular and many very fine discontinuous irregular pores; neutral; gradual smooth boundary.

A3—14 to 23 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; common medium distinct dark brown (7.5YR 4/4) redox concentrations; moderate medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine tubular and very fine and fine discontinuous irregular pores; neutral; gradual smooth boundary.

Bw—23 to 43 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; many medium distinct dark brown (7.5YR 4/4) redox concentrations; weak medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few fine tubular and common very fine and fine discontinuous irregular pores; neutral; abrupt smooth boundary.

2Cg—43 to 60 inches; grayish brown (10YR 5/2) extremely cobbly loamy coarse sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; 30 percent cobbles; 30 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Thickness of the mollic epipedon:* 25 to 43 inches
*Depth to the 2Cg horizon:* 40 to 60 inches

*A horizons*
Value: 2 or 3 moist; 3 to 5 dry
Chroma: 1 or 2
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.6 to 7.3

*Bw horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 2 or 3 moist; 3 to 5 dry
Chroma: 1 or 2
Texture: Loam, clay loam, silty clay loam, or silt loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.3

*2Cg horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 moist; 6 to 8 dry
Chroma: 1 to 3
Texture: Loamy coarse sand or coarse sand with thin layers of loam, sandy loam, or silt loam
Clay content: 5 to 25 percent
Content of rock fragments: 15 to 70 percent—5 to 40 percent cobbles; 10 to 30 percent gravel
Reaction: pH 6.6 to 7.3

## *Marcott Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 5,060 to 5,200 feet
*Annual precipitation:* 12 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Fine, smectitic, frigid Aquertic Haplustolls

## Typical Pedon

Marcott silty clay loam, 0 to 4 percent slopes, in an area of hayland, 200 feet east and 1,700 feet south of the northwest corner of sec. 27, T. 9 N., R. 13 W.; Granite County, Montana.

Az—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine subangular blocky structure parting to strong fine granular; very hard, very firm, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine random interstitial pores; few medium seams of salt; neutral; clear smooth boundary.

Bz—8 to 14 inches; light gray (10YR 7/1) silty clay loam, dark gray (10YR 4/1) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; few very fine and fine roots; many very fine and fine random interstitial pores; many medium seams of salt; neutral; clear wavy boundary.

Bzg—14 to 26 inches; gray (10YR 5/1) silty clay, gray (10YR 5/1) moist; moderate fine subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine tubular pores; many medium seams and masses of salt; neutral; gradual wavy boundary.

Bkz—26 to 60 inches; grayish brown (10YR 5/2) silty clay, gray (10YR 5/1) moist; few fine distinct strong brown (7.5YR 5/6) redox concentrations; weak fine subangular blocky structure; very hard, very firm, slightly sticky, moderately plastic; common fine masses of salt and lime; strongly effervescent; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the seasonal high water table:* 24 to 42 inches

*Az horizon*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 30 to 40 percent
- Content of rock fragments: 0 to 5 percent gravel
- Electrical conductivity: 2 to 4 mmhos/cm
- Sodium adsorption ratio: 0 to 15
- Reaction: pH 6.6 to 7.3

*Bz and Bzg horizons*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 4 to 7 dry; 3 to 5 moist
- Chroma: 1 to 3
- Texture: Silty clay loam or silty clay
- Clay content: 35 to 50 percent
- Content of rock fragments: 0 to 5 percent gravel
- Electrical conductivity: 2 to 8 mmhos/cm
- Sodium adsorption ratio: 0 to 15
- Reaction: pH 6.6 to 7.3

*Bkz horizon*
- Hue: 10YR, 2.5Y, or 5Y
- Value: 4 to 7 dry; 4 to 6 moist
- Chroma: 1 to 3

Texture: Silty clay or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 10 percent gravel
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 0 to 20
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 7.8

## *Martinsdale Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 60 percent
*Elevation range:* 4,400 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Martinsdale loam, 0 to 4 percent slopes, in an area of rangeland, 2,350 feet east and 1,450 feet north of the southwest corner of sec. 22, T. 8 N., R. 10 W.; Powell County, Montana.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many fine irregular pores; neutral; clear smooth boundary.

Bt—5 to 13 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable, slightly sticky, moderately plastic; few coarse and many very fine and fine roots; many very fine and fine tubular pores; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear wavy boundary.

Bk1—13 to 18 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine and medium tubular pores; 5 percent gravel; common fine and medium masses of lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

Bk2—18 to 33 inches; white (10YR 8/2) loam, very pale brown (10YR 7/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine tubular pores; 5 percent gravel; common fine and medium masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—33 to 60 inches; white (10YR 8/2) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common fine irregular pores; 10 percent gravel; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 16 inches
*Depth to the Bk horizon:* 11 to 30 inches

*A horizon*
- Hue: 7.5YR or 10YR
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent gravel
- Reaction: pH 6.6 to 7.8

*Bt horizon*
- Hue: 7.5YR, 10YR, or 2.5Y
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 to 4
- Texture: Sandy clay loam, loam, or clay loam
- Clay content: 25 to 35 percent
- Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
- Reaction: pH 6.6 to 8.4

*Bk horizons*
- Hue: 10YR or 2.5Y
- Value: 6 to 8 dry; 4 to 7 moist
- Chroma: 2 to 4
- Texture: Loam, clay loam, sandy clay loam, or sandy loam
- Clay content: 18 to 35 percent
- Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel
- Calcium carbonate equivalent: 15 to 35 percent
- Reaction: pH 7.4 to 9.0

## *Maurice Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Stream terraces and outwash plains
*Parent material:* Alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 5,700 to 8,400 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Haplocryolls

### Typical Pedon

Maurice cobbly loam, 8 to 15 percent slopes, in an area of rangeland, 100 feet east and 200 feet south of the northwest corner of sec. 30, T. 1 N., R. 14 W.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; many fine irregular pores; 20 percent cobbles; 10 percent gravel; slightly acid; clear smooth boundary.

Bw—7 to 12 inches; yellowish brown (10YR 5/4) gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; few very fine irregular pores; 10 percent cobbles; 10 percent gravel; slightly acid; clear smooth boundary.

BC—12 to 21 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine irregular pores; 20 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

C—21 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; single grain; soft, loose, nonsticky, nonplastic; few very fine and fine roots; few very fine irregular pores; 30 percent cobbles; 30 percent gravel; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 15 inches

*A horizon*

Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 10 to 35 percent—5 to 20 percent cobbles; 5 to 15 percent gravel
Reaction: pH 5.1 to 7.3

*Bw horizon*

Hue: 10YR or 7.5YR
Value: 3 to 5 moist; 5 or 6 dry
Chroma: 2 to 4
Texture (less than 2 mm): Loam, fine sandy loam, or sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 20 to 75 percent—10 to 35 percent cobbles; 10 to 35 percent gravel
Reaction: pH 6.1 to 7.3

*BC and C horizons*

Hue: 10YR or 7.5YR
Value: 4 to 6 moist; 5 to 7 dry
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy loam, loamy sand, or sand
Clay content: 5 to 27 percent
Content of rock fragments: 35 to 75 percent—10 to 35 percent cobbles; 20 to 35 percent gravel. (Some pedons have stones.)
Reaction: pH 6.1 to 7.3

## *Mishakal Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)

*Landform:* Mountains and hills
*Parent material:* Residuum from argillite
*Slope range:* 35 to 60 percent
*Elevation range:* 5,200 to 6,600 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid Typic Argiustolls

## Typical Pedon

Mishakal channery loam, in an area of Mishakal-Tolbert complex, 35 to 60 percent slopes, moderately impacted, in an area of woodland, 350 feet east and 700 feet north of the southwest corner of sec. 28, T. 5 N., R. 11 W.

A1—0 to 3 inches; brown (10YR 4/3) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, moderately sticky, slightly plastic; few fine and medium and many very fine roots; 5 percent flagstones; 10 percent channers; neutral; clear smooth boundary.

A2—3 to 10 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky, very plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; 5 percent channers; neutral; clear smooth boundary.

Bt1—10 to 17 inches; light olive brown (2.5Y 5/4) channery clay, olive brown (2.5Y 4/3) moist; weak fine prismatic structure parting to strong fine subangular blocky; very hard, firm, very sticky, very plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; common distinct clay films on faces of peds; 15 percent channers; neutral; gradual smooth boundary.

Bt2—17 to 28 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, very plastic; few very fine roots; few very fine tubular pores; few distinct clay films on faces of peds; 10 percent channers; slightly alkaline; abrupt smooth boundary.

Cr—28 to 60 inches; fractured argillite.

## Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 8 to 15 inches
*Depth to the Cr horizon:* 20 to 40 inches

*A1 horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent flagstones; 0 to 25 percent channers
Reaction: pH 6.1 to 7.3

*A2 horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 27 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent flagstones; 0 to 25 percent channers
Reaction: pH 6.1 to 7.3

*Bt horizons*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 20 percent channers
Reaction: pH 6.6 to 7.8

## *Mohaggin Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour) above the 2C horizon, rapid (6 to 20 inches/hour) below
*Landform:* Mountains
*Parent material:* Volcanic ash over granite colluvium
*Slope range:* 8 to 80 percent
*Elevation range:* 5,600 to 9,200 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Dystrocryepts

### Typical Pedon

Mohaggin bouldery ashy very fine sandy loam, 35 to 60 percent slopes, in an area of woodland, 400 feet east and 1,300 feet south of the northwest corner of sec. 35, T. 4 N., R. 12 W.

Oi—0 to 2 inches; largely undecomposed lodgepole pine needles and twigs.
Oe—2 to 5 inches; partially decomposed needles and twigs.
A—5 to 14 inches; light yellowish brown (10YR 6/4) bouldery ashy very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common very fine tubular pores; 10 percent boulders; 5 percent cobbles; 15 percent gravel; slightly acid; clear wavy boundary.
2Bw—14 to 22 inches; dark brown (10YR 4/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common fine and medium tubular pores; 1 percent boulders; 15 percent cobbles; 30 percent gravel; slightly acid; clear wavy boundary.
2BC—22 to 32 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few medium and common very fine and fine roots; common fine tubular pores; 1 percent boulders; 15 percent cobbles; 30 percent gravel; slightly acid; clear wavy boundary.
2C—32 to 60 inches; pale brown (10YR 6/3) very cobbly loamy sand, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few fine and medium and common very fine roots; common

very fine interstitial pores; 1 percent boulders; 20 percent cobbles; 20 percent gravel; slightly acid.

### Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 8 and 24 inches

*A horizon*
Value: 5 or 6 dry; 3 or 4 moist
Clay content: 5 to 10 percent
Content of rock fragments: 15 to 35 percent—5 to 10 percent boulders or stones; 0 to 5 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.1 to 6.5

*2Bw horizon*
Value: 3 or 4 moist; 4 or 5 dry
Chroma: 2 or 3
Clay content: 3 to 6 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent stones or boulders; 5 to 15 percent cobbles; 30 to 50 percent gravel
Reaction: pH 5.1 to 6.5

*2BC horizon*
Chroma: 2 or 3
Clay content: 3 to 6 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent stones or boulders; 5 to 15 percent cobbles; 30 to 50 percent gravel
Reaction: pH 5.1 to 6.5

*2C horizon*
Value: 5 or 6 moist; 6 or 7 dry
Chroma: 2 or 3
Texture: Loamy sand or coarse sand
Clay content: 0 to 5 percent
Content of rock fragments: 35 to 70 percent—0 to 5 percent stones or boulders; 20 to 35 percent cobbles; 15 to 35 percent gravel
Reaction: pH 5.1 to 6.5

## *Mollet Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Alluvial fans, stream terraces, and mountain slopes
*Parent material:* Alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 5,200 to 7,800 feet
*Annual precipitation:* 15 to 23 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Ustic Argicryolls

### Typical Pedon

Mollet loam, 8 to 15 percent slopes, in an area of irrigated hayland, 1,700 feet west and 400 feet north of the southeast corner of sec. 23, T. 2 N., R. 13 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine interstitial pores; neutral; clear smooth boundary.

Bt1—10 to 16 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; common very fine and fine interstitial pores; few faint clay films on faces of peds; 5 percent gravel; slightly alkaline; clear smooth boundary.

Bt2—16 to 26 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; very hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine interstitial pores; common distinct clay films on faces of peds; 10 percent gravel; slightly alkaline; gradual smooth boundary.

Bt3—26 to 36 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, moderately plastic; common fine roots; few very fine and fine interstitial pores; common distinct clay films on faces of peds; 10 percent gravel; slightly alkaline; gradual smooth boundary.

Bt4—36 to 60 inches; brown (10YR 5/3) gravelly clay, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine interstitial pores; few faint clay films on faces of peds; 5 percent cobbles; 10 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Thickness of the mollic epipedon:* 10 to 16 inches

*A horizon*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent boulders; 0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 5.6 to 7.3

*Bt1 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel
Reaction: pH 5.6 to 7.8

*Bt2 horizon*
Value: 4 or 5 dry; 4 moist
Chroma: 2 or 3
Clay content: 35 to 50 percent
Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel
Reaction: pH 5.6 to 7.8

*Bt3 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3

Clay content: 35 to 45 percent
Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel
Reaction: pH 5.6 to 7.8

*Bt4 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 35 to 45 percent
Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent gravel
Reaction: pH 5.6 to 7.8

## *Monad Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Stream terraces
*Parent material:* Alluvium from fine-grained extrusive igneous rocks
*Slope range:* 2 to 60 percent
*Elevation range:* 5,300 to 7,400 feet
*Annual precipitation:* 15 to 23 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive Alfic Argicryolls

### Typical Pedon

Monad loam, 8 to 15 percent slopes, in an area of rangeland, 1,600 feet west and 600 feet north of the southeast corner of sec. 1, T. 2 N., R. 12 W.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; strong fine granular structure; soft, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; few very fine tubular pores; moderately acid; clear wavy boundary.

A2—6 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong fine granular structure; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; few very fine tubular pores; slightly acid; clear wavy boundary.

E/Bt—14 to 21 inches; E part (80 percent) is very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; B part: (20 percent) is pale brown (10YR 6/3) sandy clay loam, dark brown (10YR 4/3) moist; texture mixed is sandy clay loam; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt/E—21 to 38 inches; B part: (60 percent) is light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; E part (40 percent) is light gray (10YR 7/2) sandy loam, dark brown (10YR 4/3) moist; texture mixed is sandy clay loam; moderate fine and medium subangular blocky structure; very hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; few fine and many very fine tubular pores; few faint clay films on faces of peds; 5 percent gravel; slightly acid; gradual wavy boundary.

Bt1—38 to 47 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; moderate coarse prismatic structure parting to strong fine and

medium subangular blocky; extremely hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; 5 percent light gray (10YR 7/2) skeletan patches; many faint clay films on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

Bt2—47 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam; yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; common very fine tubular pores; 5 percent light gray (10YR 7/2) skeletan patches; common faint clay films on faces of peds; 10 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 11 to 15 inches

*A horizons*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 5.6 to 7.3

*E/Bt and Bt/E horizons*
Value: E part: 6 or 7 dry; 4 or 5 moist; B part: 4 to 6 dry; 4 or 5 moist
Chroma: E part: 1 to 3; B part: 2 to 4
Texture: Sandy clay loam or clay loam (mixed)
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 10 percent gravel
Reaction: pH 6.1 to 7.8

*Bt horizons*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Sandy clay loam or clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 10 percent gravel
Reaction: pH 6.1 to 7.8

## *Mooseflat Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Very poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 21 inches, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains, drainageways, and mountain bases
*Parent material:* Alluvium
*Slope range:* 0 to 50 percent
*Elevation range:* 4,740 to 9,000 feet
*Annual precipitation:* 15 to 25 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaquolls

## Typical Pedon

Mooseflat loam, 0 to 2 percent slopes, in an area of pasture, 450 feet north and 3,000 feet west of the southeast corner of sec. 1, T. 1 S., R. 15 W.

Oe—0 to 1 inch; decomposed organic matt

A1—1 to 4 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; common fine faint redox concentrations; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; common very fine tubular pores; slightly acid; clear smooth boundary.

A2—4 to 9 inches; very dark grayish brown (10YR 3/2) loam dark gray (10YR 4/1) dry; common fine faint redox concentrations; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; slightly acid; clear smooth boundary.

Bw—9 to 14 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; common fine prominent redox concentrations; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; neutral; clear wavy boundary.

BC—14 to 22 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; common fine prominent redox concentrations; weak coarse subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine roots; few fine and common very fine tubular pores; neutral; clear wavy boundary.

2C—22 to 60 inches; brown (10YR 5/3) very gravelly sand, pale brown (10YR 6/3) dry; many large prominent redox concentrations; single grain; loose, nonsticky, nonplastic; few fine irregular pores; 10 percent cobbles; 40 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 16 inches
*Depth to the seasonal high water table:* 0 to 12 inches
*Surface stones and boulders:* 0 to 0.1 percent
*Note:* Some pedons have a Bg horizon.

*A horizons*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 27 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 5.6 to 7.3

*Bw and BC horizons*
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 1 or 2
Texture: Fine sandy loam, sandy loam, or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 6.1 to 7.8

*2C horizon*
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 2 to 12 percent

Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.8

## *Nana Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) above 20 inches, rapid (6 to 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 5,800 to 6,100 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaqualfs

### Typical Pedon

Nana loam, in an area of Zelda-Nana-Foolhen complex, 0 to 2 percent slopes, in an area of rangeland, 250 feet east and 2,200 feet south of the northwest corner of sec. 33, T. 1 N., R. 14 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/1) dry; weak fine granular structure; slightly hard, very friable, nonsticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; strongly alkaline; clear smooth boundary.

E—6 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; slightly effervescent; very strongly alkaline; abrupt smooth boundary.

Btn1—8 to 16 inches; very dark gray (10YR 3/1) clay loam, grayish brown (10YR 5/2) dry; strong medium columnar structure parting to strong medium angular blocky; very hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; common faint clay films on faces of peds; common grayish brown (10YR 5/2) and light gray (10YR 7/2) dry tongues of albic materials on upper vertical faces of peds; very strongly alkaline; clear smooth boundary.

Btn2—16 to 20 inches; dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; strong medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; common very fine tubular pores; common faint clay films on faces of peds; very strongly alkaline; clear smooth boundary.

2Cn1—20 to 26 inches; brown (10YR 5/3) loamy fine sand, light brownish gray (10YR 6/2) dry; single grain; loose, slightly sticky, nonplastic; common very fine roots; few medium tubular pores; 10 percent gravel; very strongly alkaline; clear smooth boundary.

2Cn2—26 to 60 inches; dark grayish brown (10YR 4/2) gravelly coarse sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; common interstitial pores; 5 percent cobbles; 20 percent gravel; very strongly alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Depth to the 2C horizon:* 20 to 40 inches

*A horizon*
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 1 or 2
Clay content: 18 to 27 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 13 to 30
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 9.0 to 9.6

*E horizon*
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 1 or 2
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 15 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 30 to 40
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 9.0 to 9.6

*Btn1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 1 or 2
Texture: Clay loam or sandy clay loam
Clay content: 27 to 35 percent
Calcium carbonate equivalent: 0 to 5 percent
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.0 to 9.6

*Btn2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 1 to 3
Texture: Clay loam or sandy clay loam
Clay content: 27 to 35 percent
Calcium carbonate equivalent: 0 to 5 percent
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.0 to 9.6

*2Cn1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Loamy fine sand, sandy loam, or loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 0 to 5 percent
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.0 to 9.6

*2Cn2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Texture: Coarse sand, sand, or loamy coarse sand
Clay content: 0 to 10 percent
Content of rock fragments: 20 to 60 percent—5 to 20 percent cobbles; 15 to 40 percent gravel
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.0 to 9.6

## *Nivean Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Ridges, hills, and mountains
*Parent material:* Residuum from welded tuff or rhyolite
*Slope range:* 4 to 60 percent
*Elevation range:* 5,100 to 6,400 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 36 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

### Typical Pedon

Nivean flaggy sandy loam, in an area of Macabre-Nivean-Rock outcrop complex, 15 to 45 percent slopes, moderately impacted, in an area of nonstocked forest, 1,200 feet west and 1,500 feet south of the northeast corner of sec. 35, T. 4 N., R. 11 W.

A1—0 to 2 inches; dark gray (10YR 4/1) flaggy sandy loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; many very fine and fine roots; 20 percent flagstones; 15 percent gravel; slightly alkaline; clear wavy boundary.
A2—2 to 7 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate very fine and fine granular; slightly hard, very friable, slightly sticky, nonplastic; few coarse and many very fine and fine roots; 10 percent cobbles; 30 percent gravel; slightly alkaline; clear wavy boundary.
Bw—7 to 13 inches; grayish brown (2.5Y 5/2) very gravelly coarse sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many medium tubular pores; 5 percent cobbles; 35 percent gravel; moderately alkaline; clear wavy boundary.
Cr—13 to 18 inches; light gray (2.5Y 7/2) semiconsolidated welded tuff.
R—18 inches; light gray (5Y 7/1), fractured hard welded tuff bedrock.

### Range in Characteristics

*Soil temperature:* 38 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* Greater than 30 percent in the coarse silt and sand fraction of one or more horizons within 30 inches
*Thickness of the mollic epipedon:* 7 to 10 inches

*Depth to the Cr horizon:* 10 to 18 inches
*Depth to bedrock:* 12 to 20 inches

*A horizons*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 10 to 20 percent
Content of rock fragments: 15 to 45 percent—5 to 25 percent flagstones or cobbles; 10 to 30 percent gravel
Reaction: pH 6.1 to 7.8

*Bw horizon*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, sandy clay loam, or coarse sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 25 percent stones and cobbles; 30 to 35 percent gravel
Reaction: pH 6.1 to 7.8

## *Pax Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Ridges, hills, and mountains
*Parent material:* Colluvium from welded tuff or rhyolite
*Slope range:* 4 to 60 percent
*Elevation range:* 5,300 to 6,900 feet
*Annual precipitation:* 18 to 24 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy, glassy, frigid Vitrandic Haplustalfs

### Typical Pedon

Pax very cobbly ashy sandy loam, in an area of Pax-Karloff-Illiano complex, 15 to 35 percent slopes, in an area of forestland, 1,300 feet east and 1,350 feet south of the northwest corner of sec. 1, T. 3 N., R. 11 W.

Oi—0 to 1/2 inch; partially decomposed needles, twigs, and leaves.
E—1/2 to 8 inches; brown (7.5YR 5/2) very cobbly ashy sandy loam, brown (7.5YR 4/2) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and many very fine and fine roots; 25 percent cobbles; 20 percent gravel; neutral; clear wavy boundary.
Bt—8 to 15 inches; brown (7.5YR 5/2) gravelly ashy sandy clay loam, dark brown (7.5YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many medium tubular pores; few faint clay films on faces of peds; 5 percent cobbles; 15 percent gravel; slightly alkaline; gradual wavy boundary.
BC—15 to 27 inches; pinkish gray (5YR 6/2) ashy coarse sandy loam, reddish brown (5YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable,

nonsticky, nonplastic; few medium and coarse and many very fine and fine roots; common medium tubular pores; 5 percent gravel; slightly alkaline; gradual wavy boundary.

Cr—27 to 60 inches; pinkish gray (5YR 7/2) decomposing welded tuff bedrock.

### Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Volcanic glass:* 30 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent
*Depth to the argillic horizon:* 4 to 10 inches
*Depth to the Cr horizon:* 20 to 40 inches

*E horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 1 or 2
Clay content: 15 to 20 percent
Content of rock fragments: 35 to 50 percent—20 to 30 percent stones and cobbles; 15 to 20 percent gravel
Reaction: pH 6.1 to 7.8

*Bt horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Ashy loam, ashy clay loam, or ashy sandy clay loam
Clay content: 23 to 30 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 6.1 to 7.8

*BC horizon*
Hue: 5YR, 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Ashy loam, ashy sandy loam, ashy coarse sandy loam, or ashy sandy clay loam
Clay content: 15 to 25 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Reaction: pH 6.1 to 7.8

## *Perma Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the BC horizon, moderately rapid (2 to 6 inches/hour) below
*Landform:* Mountains, glacial moraines, outwash plains, alluvial fans, and stream terraces
*Parent material:* Alluvium or colluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 3,500 to 6,900 feet
*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

## Typical Pedon

Perma cobbly loam, 15 to 35 percent slopes, in an area of rangeland, 650 feet south and 300 feet east of the northwest corner of sec. 10, T. 9 N., R. 14 W.; Granite County, Montana.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; 10 percent cobbles; 10 percent gravel; slightly acid; clear smooth boundary.

Bw1—7 to 12 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine tubular pores; 10 percent cobbles; 40 percent gravel; neutral; clear wavy boundary.

Bw2—12 to 20 inches; brown (10YR 5/3) very cobbly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine and fine tubular pores; 30 percent cobbles; 25 percent gravel; neutral; clear wavy boundary.

BC1—20 to 40 inches; reddish brown (5YR 5/4) extremely stony coarse sandy loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine and medium roots; 25 percent stones; 20 percent cobbles; 25 percent gravel; neutral; clear wavy boundary.

BC2—40 to 60 inches; reddish brown (5YR 5/3) extremely cobbly coarse sandy loam; reddish brown (5YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and medium roots; 10 percent stones; 35 percent cobbles; 30 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the mollic epipedon:* 10 to 15 inches

*A horizon*
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 7 to 20 percent
- Content of rock fragments: 15 to 60 percent—0 to 10 percent stones and cobbles; 10 to 55 percent gravel
- Reaction: pH 6.1 to 7.3

*Bw horizons*
- Hue: 2.5Y, 10YR, or 7.5YR
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 to 4
- Clay content: 7 to 20 percent
- Content of rock fragments: 35 to 75 percent—10 to 35 percent cobbles; 25 to 40 percent gravel
- Reaction: pH 6.6 to 7.8

*BC1 horizon*
Hue: 2.5Y, 10YR, 7.5YR, or 5YR
Value: 4 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam, loamy sand, or coarse sandy loam
Clay content: 0 to 15 percent
Content of rock fragments: 60 to 85 percent—10 to 50 percent stones and cobbles; 25 to 50 percent gravel
Reaction: pH 6.6 to 7.8

*BC2 horizon*
Hue: 2.5Y, 10YR, 7.5YR, or 5YR
Value: 4 to 7 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam, loamy sand, or coarse sandy loam
Clay content: 0 to 15 percent
Content of rock fragments: 60 to 75 percent—0 to 10 percent stones; 10 to 35 percent cobbles; 25 to 40 percent gravel
Reaction: pH 6.6 to 7.8

## *Phillcher Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Volcanic ash over colluvium
*Slope range:* 4 to 80 percent
*Elevation range:* 5,600 to 9,100 feet
*Annual precipitation:* 26 to 40 inches
*Annual air temperature:* 34 to 36 degrees F
*Frost-free period:* 20 to 40 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Eutrocryepts

### Typical Pedon

Phillcher gravelly ashy silt loam, 4 to 15 percent slopes, in an area of woodland, 1,800 feet south and 1,000 feet east of the northwest corner of sec. 7, T. 5 N., R. 11 W.

Oi—0 to 1 inch; undecomposed forest litter.
Oe—1 to 3 inches; decomposed forest litter.
Bw1—3 to 10 inches; yellowish brown (10YR 5/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; many very fine discontinuous irregular pores; 10 percent cobbles; 20 percent gravel; strongly acid; clear smooth boundary.
2Bw2—10 to 26 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine discontinuous irregular pores; 20 percent cobbles; 60 percent gravel; strongly acid; gradual smooth boundary.
2C—26 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky, nonplastic; few medium and coarse and common very fine and fine roots; common very fine and

fine discontinuous irregular pores; 20 percent cobbles; 60 percent gravel; strongly acid.

### Range in Characteristics

*Soil temperature:* 36 to 38 degrees F
*Moisture control section:* Between 8 and 24 inches

*Bw1 horizon*
Hue: 10YR or 7.5YR
Value: 4 to 6 dry; 2 to 4 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 35 percent gravel
Acid oxalate extractable Fe + Al: More than 1 percent
Moist bulk density: 1 g/cm$^3$ or less
Reaction: pH 5.1 to 6.0

*2Bw2 horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Sandy loam or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 80 percent—0 to 20 percent cobbles; 35 to 60 percent gravel
Reaction: pH 5.1 to 6.0

*2C horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Sandy loam or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 80 percent—5 to 20 percent cobbles; 55 to 60 percent gravel
Reaction: pH 5.1 to 6.0

## *Poronto Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Flood plains, stream terraces, and depressions
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Endoaquolls

## Typical Pedon

Poronto loam, 0 to 4 percent slopes, in an area of pasture, 1,900 feet south and 350 feet east of the northwest corner of sec. 11, T. 6 N., R. 10 W.; Powell County, Montana.

Oi—0 to 3 inches; slightly decomposed organic matter.

A—3 to 13 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; common fine distinct strong brown (7.5YR 5/8) redox concentrations; moderate medium granular structure; very hard, firm, moderately sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bg1—13 to 19 inches; dark gray (5YR 4/1) very gravelly silty clay loam, light gray (5YR 7/1) dry; many medium distinct strong brown (7.5YR 5/8) redox concentrations; weak medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 40 percent gravel; slightly alkaline; gradual wavy boundary.

Bg2—19 to 31 inches; dark gray (5YR 4/1) very gravelly clay loam, light gray (5YR 7/1) dry; many fine distinct yellowish red (5YR 4/6) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; common very fine and fine roots; many very fine and fine interstitial pores; 40 percent gravel; neutral; gradual wavy boundary.

Bg3—31 to 60 inches; dark gray (5YR 4/1) very gravelly sandy loam; light gray (5YR 6/1) dry; few fine distinct strong brown (7.5YR 5/8) redox concentrations; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine irregular pores; 45 percent gravel; neutral.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 14 inches
*Depth to the seasonal high water table:* 12 to 24 inches

*A horizon*

Hue: 10YR or 2.5Y
Value: 2 or 3 moist; 2 to 5 dry
Chroma: 1 or 2
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 7.8

*Bg horizons*

Hue: 5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value: 3 to 5 moist; 4 to 7 dry
Chroma: 1 to 3
Texture: Loam, clay loam, sandy clay loam, sandy loam, or silty clay loam
Clay content: 15 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent gravel
Reaction: pH 6.6 to 7.8

## *Pozega Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Low stream terraces and glacial outwash plains
*Parent material:* Calcareous alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 4,600 to 5,000 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Coarse-loamy, carbonatic, frigid Aquic Calciustepts

### Typical Pedon

Pozega silty clay loam, 0 to 4 percent slopes, in an area of rangeland, 200 feet north and 1,800 feet west of the southeast corner of sec. 7, T. 5 N., R. 9 W.

Az1—0 to 2 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, firm, moderately sticky, moderately plastic; many very fine, fine, and medium roots; many fine tubular pores; strongly effervescent; slightly alkaline; clear smooth boundary.

Az2—2 to 5 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; soft, very friable, moderately sticky, slightly plastic; many very fine, fine, and medium roots; many fine tubular pores; violently effervescent; slightly alkaline; clear smooth boundary.

Bk1—5 to 11 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 5/3) moist; few fine faint light brown (7.5YR 6/4) redox concentrations; moderate medium subangular blocky structure; soft, very friable, moderately sticky, slightly plastic; common very fine, fine, and medium roots; common fine tubular pores; disseminated lime; few fine masses of lime; violently effervescent; slightly alkaline; clear smooth boundary.

Bk2—11 to 22 inches; light gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine, fine, and medium roots; common fine tubular pores; 5 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; slightly alkaline; clear smooth boundary.

Bk3—22 to 29 inches; light gray (10YR 7/2) silt loam, gray (10YR 6/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine, fine, and medium roots; common fine tubular pores; 5 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Ckg—29 to 54 inches; white (10YR 8/1) silt loam, light gray (10YR 7/1) moist; massive; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common fine tubular pores; 10 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

2Ck—54 to 60 inches; light gray (10YR 7/2) very gravelly loam, light brownish gray (2.5Y 6/2) moist; few fine distinct dark brown (7.5YR 4/3) redox concentrations; massive; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; 15 percent cobbles; 35 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 8 and 24 inches
*Depth to the calcic horizon:* 3 to 10 inches
*Depth to the seasonal high water table:* 24 to 42 inches
*Depth to the 2C horizon:* Greater than 40 inches

Az1 horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 2 to 4 moist
Chroma: 1 or 2
Clay content: 27 to 40 percent
Content of rock fragments: 0 to 15 percent gravel
Sodium adsorption ratio: 5 to 30
Electrical conductivity: 4 to 25 mmhos/cm
Calcium carbonate equivalent: 5 to 35 percent
Reaction: pH 7.4 to 8.4

*Az2 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 or 4 moist
Chroma: 1 to 3
Texture: Silt loam, loam, or silty clay loam
Clay content: 18 to 40 percent
Content of rock fragments: 0 to 15 percent gravel
Sodium adsorption ratio: 10 to 20
Electrical conductivity: 4 to 16 mmhos/cm
Calcium carbonate equivalent: 5 to 35 percent
Reaction: pH 7.4 to 8.4

*Bk1 horizon*
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 1 to 3
Texture: Silty clay loam, clay loam, loam, silt loam, or very fine sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 10 to 60 percent
Reaction: pH 7.4 to 8.4

*Bk2 and Bk3 horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 1 or 2
Texture: Loam, very fine sandy loam, or silt loam
Clay content: 10 to 18 percent
Content of rock fragments: 5 to 30 percent—0 to 10 percent cobbles; 5 to 20 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.4 to 8.4

*Ckg horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 7 or 8 dry; 6 or 7 moist
Texture: Very fine sandy loam, loam, or silt loam
Clay content: 10 to 25 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.4 to 8.4

*2Ck horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 1 or 2
Texture: Loamy sand, sand, sandy loam, or loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 70 percent—10 to 30 percent cobbles; 25 to 40 percent gravel
Calcium carbonate equivalent: 10 to 30 percent
Reaction: pH 7.4 to 8.4

## *Quigg Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Stream terraces and alluvial fans
*Parent material:* Alluvium
*Slope range:* 2 to 35 percent
*Elevation range:* 5,700 to 6,400 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Abruptic Argicryolls

### Typical Pedon

Quigg loam, in an area of Quigg-Mollet complex, 2 to 8 percent slopes, in an area of rangeland, 1,500 feet west and 1,150 feet south of the northeast corner of sec. 31, T. 1 N., R. 14 W.

A—0 to 7 inches; grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common fine interstitial pores; slightly acid; clear smooth boundary.

E/Bt—7 to 17 inches; E part (85 percent) light gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) moist; B part: (15 percent) light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; common fine interstitial pores; slightly acid; abrupt wavy boundary.

Bt—17 to 29 inches; light yellowish brown (10YR 6/4) sandy clay, yellowish brown (10YR 5/4) moist; strong very coarse columnar structure; extremely hard, very firm, moderately sticky, moderately plastic; common very fine and fine roots; common tongues of albic materials on upper vertical faces of peds, light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) moist; continuous prominent clay films on faces of peds, yellowish brown (10YR 5/4) and dark brown (10YR 3/3) moist; slightly acid; gradual wavy boundary.

BC—29 to 38 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate thick platy structure; extremely hard, very firm, moderately sticky,

moderately plastic; few very fine roots; few very fine interstitial pores; slightly acid; gradual wavy boundary.

C1—38 to 45 inches; light gray (10YR 7/2) silty clay, light brownish gray (10YR 6/2) moist; strong thick platy structure; extremely hard, very firm, moderately sticky, moderately plastic; few very fine roots; few very fine interstitial pores; slightly acid; gradual wavy boundary.

C2—45 to 60 inches; light gray (10YR 7/2) silty clay, light brownish gray (10YR 6/2) moist; strong thick platy structure; extremely hard, very firm, moderately sticky, moderately plastic; few very fine interstitial pores; slightly acid.

## Range in Characteristics

*Mean annual soil temperature:* 35 to 40 degrees F
*Mean summer soil temperature:* 55 to 59 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the argillic horizon:* 8 to 19 inches
*Thickness of the mollic epipedon:* 7 to 9 inches

*A horizon*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

*E/Bt horizon*
Hue: 10YR or 2.5Y
Value: E part: 6 or 7 dry; 5 or 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: B part: 3 or 4
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

*Bt horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Sandy clay, silty clay, or clay
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

*BC horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

*C horizons*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4
Texture: Silty clay, clay, or sandy clay loam
Clay content: 30 to 50 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

## *Quigley Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, stream terraces, outwash plains, and moraines
*Parent material:* Calcareous alluvium or till
*Slope range:* 0 to 35 percent
*Elevation range:* 3,800 to 6,400 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Haplustolls

### Typical Pedon

Quigley loam, 0 to 4 percent slopes, in an area of rangeland, 350 feet west and 100 feet south of the northeast corner of sec. 35, T. 7 N., R. 9 W.; Powell County, Montana.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine and fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

Bw—3 to 10 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, moderately sticky, moderately plastic; many fine roots; many very fine and fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

Bk1—10 to 13 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine roots; few fine tubular and common fine irregular pores; 5 percent gravel; many fine and medium masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—13 to 23 inches; white (10YR 8/1) gravelly loam; light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; many fine tubular and irregular pores; 5 percent cobbles; 10 percent gravel; disseminated lime; continuous faint lime coats on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—23 to 45 inches; light gray (2.5Y 7/2) gravelly loam; light yellowish brown (2.5Y 6/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; common fine tubular and many very fine and fine irregular pores; 5 percent cobbles; 15 percent gravel; disseminated lime; continuous faint lime coats on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

2Bk4—45 to 60 inches; very pale brown (10YR 7/3) very cobbly sandy loam; pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, very

friable, nonsticky, slightly plastic; many fine irregular pores; 20 percent cobbles; 20 percent gravel; disseminated lime; continuous faint lime coats on undersides of rock fragments; violently effervescent; strongly alkaline.

## Range in Characteristics

*Soil temperature:* 40 to 46 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the Bk horizon:* 7 to 15 inches

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 40 percent—0 to 25 percent cobbles; 0 to 15 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 4 to 6 dry
Chroma: 2 or 3
Texture (less than 2 mm): Loam or clay loam
Clay content: 18 to 33 percent
Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bk1 horizon*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 18 to 33 percent
Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Value: 7 or 8 dry; 5 to 7 moist
Chroma: 1 to 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 10 to 25 percent—5 to 10 percent cobbles; 5 to 15 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 9.0

*Bk3 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy loam
Clay content: 18 to 33 percent
Content of rock fragments: 10 to 30 percent—5 to 15 percent cobbles; 5 to 15 percent gravel

Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 9.0

*2Bk4 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam, clay loam, or sandy loam
Clay content: 10 to 30 percent
Content of rock fragments: 30 to 50 percent—15 to 25 percent cobbles; 15 to 25 percent gravel
Calcium carbonate equivalent: 10 to 20 percent
Reaction: pH 7.9 to 9.0

## *Redchief Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium from igneous bedrock
*Slope range:* 2 to 60 percent
*Elevation range:* 5,200 to 8,400 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, smectitic Ustic Argicryolls

### Typical Pedon

Redchief cobbly loam, 8 to 15 percent slopes, in an area of rangeland, 3,200 feet west and 2,900 feet south of the northeast corner of sec. 1, T. 2 N., R. 12 W.

A1—0 to 5 inches; brown (10YR 5/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 10 percent gravel; strongly acid; clear smooth boundary.

A2—5 to 10 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 20 percent gravel; moderately acid; clear smooth boundary.

Bt1—10 to 16 inches; pale brown (10YR 6/3) very cobbly clay, brown (10YR 4/3) moist; strong medium subangular blocky structure; extremely hard, very firm, moderately sticky, moderately plastic; few very fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.

Bt2—16 to 22 inches; light yellowish brown (10YR 6/4) very cobbly clay loam, yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.

C—22 to 60 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/6) moist; massive; hard, firm, moderately sticky, moderately plastic; few very

fine roots; common very fine and fine interstitial pores; 10 percent cobbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 36 to 45 degrees F
*Thickness of the mollic epipedon:* 10 to 15 inches

*A horizons*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 to 3
Clay content: 20 to 27 percent
Content of rock fragments: 15 to 40 percent—10 to 30 percent boulders, stones, and cobbles; 5 to 25 percent gravel
Reaction: pH 5.1 to 7.3

*Bt horizons*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4 or 6
Texture: Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles; 15 to 30 percent gravel
Reaction: pH 5.1 to 7.3

*C horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry
Chroma: 4 or 6
Texture: Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 10 to 60 percent—10 to 30 percent cobbles; 0 to 30 percent gravel
Reaction: pH 5.1 to 7.3

## *Redfern Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills and mountains
*Parent material:* Residuum from hard fine-grained sandstone or fine-grained igneous rock
*Slope range:* 15 to 45 percent
*Elevation range:* 6,400 to 7,800 feet
*Annual precipitation:* 18 to 24 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 60 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lithic Haplocryalfs

### Typical Pedon

Redfern very cobbly loam, in an area of Redfern-Copenhaver-Rock outcrop complex, 15 to 45 percent slopes, in an area of forestland, 650 feet east and 1,600 feet south of the northwest corner of sec. 20, T. 3 N., R. 10 W.

Oi—0 to 1 inch; partially decomposed needles, twigs, and leaves.

A—1 to 4 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; 20 percent cobbles; 20 percent gravel; moderately acid; clear wavy boundary.

E—4 to 8 inches; light yellowish brown (2.5Y 6/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine interstitial pores; 25 percent cobbles; 20 percent gravel; moderately acid; gradual wavy boundary.

Bt—8 to 19 inches; pale yellow (2.5Y 7/3) very cobbly loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few medium and common very fine and fine roots; common very fine interstitial pores; 25 percent cobbles; 30 percent gravel; slightly acid; gradual wavy boundary.

R—19 inches; very dark gray (5Y 3/1), hard fine-grained sandstone bedrock.

## Range in Characteristics

*Soil temperature:* 38 to 42 degrees F

*Moisture control section:* Between 4 and 12 inches or between 4 inches and the lithic contact if less than 12 inches

*Depth to the Bt horizon:* 3 to 13 inches

*Depth to bedrock:* 10 to 20 inches

*A horizon*

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 2 to 5 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent stones and cobbles; 20 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*E horizon*

Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 15 to 27 percent
Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 25 percent cobbles; 20 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*Bt horizon*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 70 percent—0 to 15 percent stones; 15 to 30 percent cobbles; 20 to 45 percent gravel
Reaction: pH 5.6 to 7.3

## *Relyea Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Colluvium from limestone and calcareous argillite
*Slope range:* 15 to 35 percent
*Elevation range:* 5,700 to 7,800 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive Eutric Glossocryalfs

### Typical Pedon

Relyea gravelly loam, in an area of Relyea-Helmville complex, 35 to 60 percent slopes, in an area of woodland, 1,900 feet south and 2,700 feet east of the northwest corner of sec. 2, T. 10 N., R. 9 W.; Powell County, Montana.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.

E—2 to 5 inches; light reddish brown (5YR 6/3) gravelly loam, reddish brown (5YR 4/3) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; few very fine discontinuous tubular and many very fine and fine discontinuous irregular pores; 5 percent cobbles; 25 percent gravel; slightly acid; clear smooth boundary.

Bt/E—5 to 8 inches; B part: (80 percent) is reddish brown (5YR 4/4) very gravelly clay loam, dark reddish gray (5YR 4/2) moist; E part (20 percent) is light reddish brown (5YR 6/3) very gravelly loam, reddish brown (5YR 4/3) moist tongues; texture mixed is very gravelly clay loam; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky, moderately plastic; many very fine and fine and common medium and coarse roots; many very fine and fine discontinuous irregular and many very fine discontinuous tubular pores; common distinct clay films on faces of peds; 5 percent cobbles; 35 percent gravel; slightly acid; clear smooth boundary.

Bt—8 to 17 inches; reddish brown (5YR 4/4) very gravelly clay loam, dark reddish gray (5YR 4/2) moist; moderate fine subangular blocky structure; very hard, very firm, slightly sticky, moderately plastic; common very fine, fine, and coarse and many medium roots; many very fine and fine discontinuous irregular pores and many very fine discontinuous tubular pores; many distinct clay films on faces of peds; 10 percent cobbles; 30 percent gravel; neutral; clear wavy boundary.

Btk—17 to 30 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; few coarse and common very fine, fine, and medium roots; many very fine and fine discontinuous irregular pores; few faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; disseminated lime; continuous faint and distinct lime casts on undersides of coarse fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk1—30 to 38 inches; pinkish gray (7.5YR 7/2) extremely gravelly loam; light brown (7.5YR 6/4) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and medium roots; few very fine discontinuous irregular pores; 20 percent cobbles; 45 percent gravel; disseminated lime; continuous faint and

distinct lime casts coating coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—38 to 60 inches; pinkish gray (7.5YR 7/2) extremely cobbly loam; light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine discontinuous irregular pores; 30 percent cobbles; 40 percent gravel; disseminated lime; continuous faint and distinct lime casts coating coarse fragments; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 40 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 15 to 40 inches
*Base saturation:* Greater than 50 percent throughout

*E horizon*
- Hue: 10YR, 7.5YR, or 5YR
- Value: 6 or 7 dry; 3 to 5 moist
- Chroma: 2 or 3
- Clay content: 20 to 27 percent
- Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
- Reaction: pH 6.1 to 7.3

*Bt/E horizon*
- Hue: 10YR, 7.5YR, or 5YR
- Value: B part: 4 or 5 dry; 3 or 4 moist; E part: 5 to 7 dry; 4 or 5 moist
- Chroma: B part: 2 to 4 or 6; E part: 2 or 3
- Clay content: 27 to 35 percent
- Content of rock fragments: 15 to 50 percent—5 to 10 percent cobbles; 10 to 35 percent gravel
- Reaction: pH 6.1 to 7.3

*Bt horizon*
- Hue: 10YR, 7.5YR, 5YR, or 2.5YR
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 to 4 or 6
- Texture: Clay loam, clay, or silty clay loam
- Clay content: 35 to 50 percent
- Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent gravel
- Reaction: pH 6.1 to 7.3

*Btk horizon*
- Hue: 10YR, 7.5YR, 5YR, or 2.5YR
- Value: 4 to 7 dry; 4 to 6 moist
- Chroma: 2 to 4 or 6
- Texture: Clay loam, clay, or silty clay loam
- Clay content: 27 to 45 percent
- Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
- Calcium carbonate equivalent: 5 to 15 percent
- Reaction: pH 7.9 to 8.4

*Bk1 horizon*
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 to 4 or 6
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 40 to 75 percent—15 to 30 percent cobbles; 25 to 45 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4 or 6
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 60 to 80 percent—25 to 35 percent cobbles; 35 to 45 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

## *Rochester Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Excessively drained
*Permeability:* Rapid (6 to 20 inches/hour)
*Landform:* Mountains and hills
*Parent material:* Colluvium from granite
*Slope range:* 15 to 60 percent
*Elevation range:* 3,800 to 7,400 feet
*Annual precipitation:* 15 to 25 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Typic Ustorthents

### Typical Pedon

Rochester very stony sandy loam, in an area of Ambrant-Rochester complex, 15 to 35 percent slopes, in an area of woodland, 400 feet south and 1,200 feet east of the northwest corner of sec. 5, T. 13 N., R. 12 W.; Powell County, Montana.

Oe—0 to 2 inches; partially decomposed organic matter.
A—2 to 5 inches; grayish brown (10YR 5/2) very stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; few very fine discontinuous interstitial pores; 25 percent stones; 5 percent cobbles; 15 percent gravel; neutral; clear smooth boundary.
C1—5 to 18 inches; pale brown (10YR 6/3) very stony loamy sand, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine and common medium roots; few very fine discontinuous interstitial pores; 40 percent stones; 10 percent cobbles; slightly acid; gradual smooth boundary.
C2—18 to 60 inches; pale brown (10YR 6/3) very stony loamy sand; brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few fine and medium roots; few very fine discontinuous interstitial pores; 40 percent stones; 15 percent cobbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 12 and 35 inches

*A horizon*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 1 to 3
Texture: Sandy loam, coarse sandy loam, or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 60 percent—15 to 25 percent boulders and stones; 0 to 20 percent cobbles; 15 to 35 percent gravel
Reaction: pH 6.6 to 7.3

*C1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Loamy sand, sand, coarse sandy loam, or sandy loam
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 80 percent—30 to 40 percent boulders and stones; 0 to 40 percent cobbles; 0 to 30 percent gravel
Reaction: pH 5.6 to 7.3

*C2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 1 to 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 80 percent—30 to 40 percent boulders and stones; 5 to 25 percent cobbles; 0 to 45 percent gravel
Reaction: pH 5.6 to 7.8

## *Roy Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains, hills, alluvial fans, and stream terraces
*Parent material:* Alluvium or colluvium from igneous rock
*Slope range:* 2 to 70 percent
*Elevation range:* 3,800 to 6,800 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Roy gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 400 feet north and 2,000 feet east of the southwest corner of sec. 25, T. 6 N., R. 11 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable,

slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine discontinuous irregular pores; 10 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

A2—4 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; many very fine discontinuous irregular pores; 10 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.

Bt1—7 to 16 inches; brown (10YR 4/3) very cobbly clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common fine and medium and many very fine roots; common fine tubular pores; few faint clay films on faces of peds; 20 percent cobbles; 30 percent gravel; neutral; clear smooth boundary.

Bt2—16 to 27 inches; brown (10YR 5/3) very cobbly clay loam, brown (10YR 4/3) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common fine and medium and many very fine roots; common fine tubular pores; many distinct clay films on faces of peds; 20 percent cobbles; 30 percent gravel; neutral; clear smooth boundary.

Bk—27 to 60 inches; pale brown (10YR 6/3) very cobbly clay loam; brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, slightly plastic; few fine and medium and common very fine roots; few fine tubular pores; 20 percent cobbles; 30 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 16 inches
*Depth to the Bk horizon:* Greater than 20 inches

*A horizons*

Hue: 10YR or 7.5YR
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 15 to 40 percent
Content of rock fragments: 20 to 65 percent—5 to 30 percent stones and cobbles; 15 to 35 percent gravel
Reaction: pH 6.1 to 7.8

*Bt horizons*

Hue: 10YR or 7.5YR
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 50 percent gravel
Reaction: pH 6.6 to 7.8

*Bk horizon*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Clay content: 27 to 40 percent

Content of rock fragments: 40 to 65 percent—10 to 20 percent cobbles; 30 to 45 percent gravel
Calcium carbonate equivalent: 2 to 15 percent
Reaction: pH 7.4 to 8.4

## *Rumsey Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Volcanic ash over colluvium from limestone
*Slope range:* 8 to 60 percent
*Elevation range:* 6,400 to 7,200 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 34 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Eutrocryepts

### Typical Pedon

Rumsey gravelly ashy silt loam, 15 to 35 percent slopes, in an area of woodland, 1,800 feet east and 1,800 feet south of the northwest corner of sec. 5, T. 6 N., R. 13 W.

Oi—0 to 1 inch; partially decomposed organic matter.

E—1 to 3 inches; pale brown (10YR 6/3) gravelly ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and coarse roots; many very fine and fine tubular pores; 15 percent gravel; slightly alkaline; clear smooth boundary.

Bw1—3 to 8 inches; strong brown (7.5YR 5/6) ashy silt loam, strong brown (7.5YR 4/6) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 5 percent gravel; slightly alkaline; clear smooth boundary.

2Bw2—8 to 15 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 5 percent cobbles; 15 percent gravel; slightly alkaline; gradual wavy boundary.

2Bk1—15 to 30 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 15 percent cobbles; 30 percent gravel; few fine masses of lime; slightly effervescent; slightly alkaline; clear wavy boundary.

2Bk2—30 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and medium and common very fine roots; many very fine and fine tubular pores; 15 percent cobbles; 35 percent gravel; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Acid oxalate extractable Al + ½ Fe:* More than 1 percent

*Moist bulk density:* Less than 1 g/cm$^3$
*Depth to the Bk horizon:* 9 to 24 inches

*E horizon*
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.8

*Bw1 horizon*
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 4 or 6
Clay content: 18 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel
Reaction: pH 5.6 to 7.8

*2Bw2 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 60 percent—0 to 15 percent cobbles; 15 to 45 percent gravel
Reaction: pH 6.1 to 7.8

*2Bk horizons*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Loam or sandy loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 80 percent—10 to 20 percent cobbles; 25 to 60 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.4 to 8.4

## *Saypo Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Stream terraces, alluvial fans, and flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aquic Calciustolls

## Typical Pedon

Saypo loam, 0 to 4 percent slopes, rarely flooded, in an area of pasture, 600 feet north and 1,850 feet west of the southeast corner of sec. 4, T. 7 N., R. 9 W.; Powell County, Montana.

Oe—0 to 2 inches; partially decomposed organic matter.

Ap—2 to 9 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; strong medium granular structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine roots, common medium roots; many very fine irregular pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—9 to 17 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; strong medium granular structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine roots, common medium roots; many very fine irregular pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—17 to 33 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; few fine distinct brown (10YR 4/3) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine irregular pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—33 to 49 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; few fine distinct brown (10YR 4/3) redox concentrations; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, moderately plastic; few very fine and fine roots; many very fine irregular pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C—49 to 60 inches; dark brown (7.5YR 4/4) loam; brown (7.5YR 5/4) dry; common fine distinct strong brown (7.5YR 4/6) redox concentrations; massive; soft, very friable, nonsticky, nonplastic; 5 percent gravel; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 42 to 46 degrees F
*Thickness of the mollic epipedon:* 7 to 12 inches
*Depth to the seasonal high water table:* 24 to 42 inches
*Depth to the Bk horizon:* 5 to 12 inches

*Ap horizon*
Hue: 10YR or 2.5Y
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 22 to 27 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*Bk1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Silt loam, clay loam, or loam
Clay content: 22 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 20 to 25 percent
Reaction: pH 7.9 to 8.4

*Bk2 and Bk3 horizons*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Clay loam, silty clay loam, silt loam, or loam
Clay content: 22 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel
Calcium carbonate equivalent: 30 to 35 percent
Electrical conductivity: 0 to 4 mmhos/cm (saline phase 2 to 4 mmhos/cm)
Reaction: pH 7.9 to 8.4

*C horizon*
Hue: 7.5YR, 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam or loam
Clay content: 22 to 40 percent
Content of rock fragments: 5 to 50 percent—0 to 10 percent cobbles; 5 to 40 percent gravel
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.9 to 8.4

## *Shawmut Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains, alluvial fans, stream terraces, and moraines
*Parent material:* Alluvium or till
*Slope range:* 0 to 60 percent
*Elevation range:* 3,800 to 6,900 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Shawmut gravelly loam, 4 to 8 percent slopes, in an area of rangeland, 1,700 feet north and 1,500 feet east of the southwest corner of sec. 26, T. 8 N., R. 10 W.; Powell County, Montana.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to strong medium granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine and many very fine and medium tubular pores; 5 percent cobbles; 15 percent gravel; neutral; clear smooth boundary.

Bt—6 to 12 inches; brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common medium and many very fine and fine tubular pores; common faint clay films on faces of peds; 5 percent cobbles; 25 percent gravel; neutral; clear smooth boundary.

Btk—12 to 18 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, firm, slightly sticky, slightly plastic; few very fine roots; common fine and many very fine and medium tubular pores; few faint clay films on faces of peds; 10 percent cobbles; 35 percent gravel; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk1—18 to 29 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine, fine, and medium tubular pores; 10 percent cobbles; 35 percent gravel; common distinct lime casts on undersides of coarse fragments; violently effervescent; strongly alkaline; gradual wavy boundary.

Bk2—29 to 60 inches; white (10YR 8/2) extremely cobbly loam; light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine, fine, and medium tubular pores; 25 percent cobbles; 40 percent gravel; disseminated lime; violently effervescent; strongly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 8 to 14 inches
*Depth to the calcic horizon:* 9 to 20 inches

*A horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Content of rock fragments: 10 to 65 percent—0 to 40 percent stones and boulders; 0 to 25 percent cobbles; 10 to 25 percent gravel
Reaction: pH 6.6 to 7.3

*Bt horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 6 dry; 2 to 4 moist
Chroma: 2 or 3
Texture: Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 15 to 65 percent—0 to 15 percent stones; 0 to 15 percent cobbles; 15 to 40 percent gravel
Reaction: pH 6.6 to 7.3

*Btk horizon*
Hue: 7.5YR or 10YR
Value: 3 to 6 dry; 2 to 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 15 to 30 percent
Content of rock fragments: 5 to 65 percent—0 to 20 percent stones; 5 to 15 percent cobbles; 30 to 45 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

*Bk horizons*
Hue: 10YR or 2.5Y
Value: 5 to 8 dry; 4 to 7 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 65 percent—0 to 20 percent stones; 5 to 25 percent cobbles; 30 to 40 percent gravel
Calcium carbonate equivalent: 10 to 25 percent
Reaction: pH 7.9 to 9.0

## *Shook Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium or residuum from granite
*Slope range:* 15 to 60 percent
*Elevation range:* 5,800 to 6,600 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive Pachic Haplocryolls

### Typical Pedon

Shook loam, in an area of Sula-Shook complex, 35 to 60 percent slopes, in an area of rangeland, 2,950 feet east and 1,000 feet north of the southwest corner of sec. 18, T. 1 N., R. 13 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine interstitial pores; 10 percent gravel; moderately acid; clear smooth boundary.

A2—2 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; common very fine and fine interstitial pores; 10 percent gravel; slightly acid; clear smooth boundary.

Bw1—6 to 11 inches; brown (10YR 4/3) gravelly coarse sandy loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; common very fine and fine interstitial pores; 15 percent gravel; neutral; clear wavy boundary.

Bw2—11 to 28 inches; dark grayish brown (10YR 4/2) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; many very fine and fine roots; few medium and coarse interstitial pores; 15 percent gravel; neutral; gradual wavy boundary.

BC—28 to 40 inches; brown (10YR 5/3) gravelly coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine interstitial pores; 20 percent gravel; neutral; gradual wavy boundary.

Cr—40 to 60 inches; brown (10YR 5/3) decomposing granite that crushes to very gravelly loamy sand; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 8 and 24 inches
*Thickness of the mollic epipedon:* 16 to 30 inches
*Depth to the Cr horizon:* 20 to 40 inches

*A horizons*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 to 3
Clay content: 18 to 27 percent
Content of rock fragments: 10 to 15 percent gravel
Reaction: pH 5.6 to 7.3

*Bw horizons*
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 or 3
Texture: Coarse sandy loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 10 to 35 percent gravel
Reaction: pH 6.1 to 7.3

*BC horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 0 to 10 percent
Content of rock fragments: 15 to 35 percent gravel
Reaction: pH 6.1 to 7.3

## *Silverchief Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Slope alluvium
*Slope range:* 8 to 35 percent
*Elevation range:* 5,400 to 6,400 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid Calcic Haplustalfs

### Typical Pedon

Silverchief loam, in an area of Silverchief-Trapps complex, 15 to 35 percent slopes, in an area of woodland, 3,400 feet east and 300 feet north of the southwest corner of sec. 24, T. 5 N., R. 16 W.; Granite County, Montana.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E—2 to 5 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; few fine interstitial pores; 5 percent gravel; slightly acid; clear wavy boundary.
Bt1—5 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, friable, moderately sticky,

moderately plastic; few coarse, common medium, and many very fine and fine roots; common fine interstitial pores; few faint clay films on faces of peds; 10 percent gravel; slightly acid; clear wavy boundary.

Bt2—14 to 22 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium angular blocky structure; very hard, very firm, very sticky, very plastic; few coarse, common medium, and many very fine and fine roots; common fine tubular pores; few faint clay films on faces of peds; 10 percent gravel; neutral; clear wavy boundary.

Bt3—22 to 40 inches; pale brown (10YR 6/3) gravelly clay, brown (10YR 5/3) moist; strong medium angular blocky structure; very hard, very firm, very sticky, very plastic; few medium and coarse and common very fine and fine roots; common fine and many very fine tubular pores; few faint clay films on faces of peds; 15 percent gravel; neutral; gradual smooth boundary.

Bk—40 to 60 inches; light gray (2.5Y 7/2) gravelly clay loam; light brownish gray (2.5Y 6/2) moist; weak fine subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine roots; common very fine and fine tubular pores; 5 percent cobbles; 25 percent gravel; common fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 40 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the calcic horizon:* 20 to 40 inches

*E horizon*

Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent gravel
Reaction: pH 6.1 to 7.3

*Bt horizons*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture: Clay loam or clay
Clay content: 35 to 60 percent
Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent gravel
Reaction: pH 6.1 to 7.3

*Bk horizon*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or clay
Clay content: 20 to 45 percent
Content of rock fragments: 20 to 50 percent—5 to 20 percent cobbles; 15 to 30 percent gravel
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 8.4

## *Sixbeacon Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour) to 24 inches, rapid (6 to 20 inches/hour) below
*Landform:* Alluvial fans and stream terraces
*Parent material:* Gravelly alluvium
*Slope range:* 0 to 60 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Aridic Haplustolls

### Typical Pedon

Sixbeacon gravelly loam, 0 to 4 percent slopes, in an area of irrigated hayland, 100 feet north and 1,000 feet west of the southeast corner of sec. 23, T. 8 N., R. 9 W.; Powell County, Montana.

Ap—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many fine irregular pores; 15 percent gravel; neutral; abrupt smooth boundary.

Bw—4 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine and fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

Bk1—10 to 12 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine tubular pores; 10 percent gravel; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bk2—12 to 24 inches; white (10YR 8/2) very gravelly sandy loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine roots; many very fine and fine tubular pores; 50 percent gravel; disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

3Bk3—24 to 60 inches; light gray (10YR 7/2) extremely gravelly loamy sand; pale brown (10YR 6/3) moist; single grain; loose, nonsticky, nonplastic; few fine roots; many fine irregular pores; 10 percent cobbles; 60 percent gravel; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches; dry in all parts between four tenths and five tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher
*Thickness of the mollic epipedon:* 7 to 13 inches
*Depth to the calcic horizon:* 8 to 13 inches

*Ap horizon*
Hue: 10YR or 2.5Y
Chroma: 2 or 3

Clay content: 10 to 27 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.1 to 7.3

*Bw horizon*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.8

*Bk1 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 8 dry; 4 to 7 moist
Chroma: 1 to 4
Clay content: 20 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent gravel
Reaction: pH 7.4 to 8.4
Calcium carbonate equivalent: 5 to 15 percent

*2Bk2 horizon*
Hue: 10YR or 2.5Y
Value: 6 to 8 dry; 6 or 7 moist
Chroma: 2 to 4
Texture: Sandy loam or loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel
Calcium carbonate equivalent: 20 to 40 percent
Reaction: pH 7.9 to 8.4

*3Bk3 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Sandy loam or loamy sand
Clay content: 0 to 5 percent
Content of rock fragments: 50 to 80 percent—10 to 20 percent cobbles; 40 to 60 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.4 to 8.4

## Staad Series

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Drainageways and alluvial fans
*Parent material:* Alluvium
*Slope range:* 0 to 25 percent
*Elevation range:* 3,800 to 6,900 feet
*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls

## Typical Pedon

Staad silty clay loam, 0 to 4 percent slopes, in an area of irrigated cropland, 1,100 feet south and 1,700 feet east of the northwest corner of sec. 36, T. 10 N., R. 13 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky, moderately plastic; common medium and many very fine and fine roots; few very fine tubular and many discontinuous tubular pores; 5 percent cobbles; slightly alkaline; gradual wavy boundary.

A2—6 to 16 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky, moderately plastic; common very fine, fine, and medium roots; few very fine tubular and many discontinuous tubular pores; 5 percent cobbles; slightly alkaline; clear wavy boundary.

Bw1—16 to 23 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine and fine and many discontinuous tubular pores; 5 percent cobbles; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bw2—23 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine, fine, and medium discontinuous tubular pores; 5 percent cobbles; slightly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 16 to 25 inches

*Ap horizon*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Silty clay loam or loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 10 percent
Reaction: pH 6.6 to 7.8

*A2 horizon*
Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 22 to 32 percent
Content of rock fragments: 0 to 10 percent
Reaction: pH 6.6 to 7.8

*Bw horizons*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 22 to 35 percent
Content of rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 7.8 to 8.4

## *Sula Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Alluvial fans, stream terraces, and mountains
*Parent material:* Colluvium and residuum from granite
*Slope range:* 15 to 60 percent
*Elevation range:* 5,800 to 6,600 feet
*Annual precipitation:* 15 to 22 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive Ustic Haplocryolls

### Typical Pedon

Sula gravelly loam, in an area of Sula-Shook complex, 35 to 60 percent slopes, in an area of rangeland, 2,300 feet east and 200 feet south of the northwest corner of sec. 35, T. 2 N., R. 13 W.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; slightly hard, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; many very fine and fine interstitial pores; 15 percent gravel; moderately acid; clear smooth boundary.

A2—5 to 14 inches; dark gray (10YR 4/1) gravelly sandy loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine interstitial pores; 15 percent gravel; slightly acid; gradual smooth boundary.

Bw—14 to 28 inches; brown (10YR 5/3) gravelly sandy loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; few fine roots; common fine interstitial pores; 20 percent gravel; neutral; gradual smooth boundary.

BC—28 to 60 inches; brown (10YR 5/3) gravelly loamy coarse sand, gray (10YR 5/1) moist; single grain; loose, nonsticky, nonplastic; common fine interstitial pores; 25 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Thickness of the mollic epipedon:* 7 to 15 inches

*A horizons*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 to 3
Texture: Loam or sandy loam

Clay content: 10 to 18 percent
Content of rock fragments: 15 to 35 percent gravel
Reaction: pH 6.6 to 7.3

*Bw horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Coarse sandy loam or sandy loam
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 25 percent gravel
Reaction: pH 6.6 to 7.3

*BC horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Coarse sandy loam, loamy sand, or loamy coarse sand
Clay content: 5 to 18 percent
Content of rock fragments: 0 to 35 percent gravel
Reaction: pH 6.6 to 7.3

## *Tepecreek Series*

*Depth class:* Moderately deep (20 to 40 inches) to weathered granite bedrock (grus) and deep (40 to 60 inches) to hard granite bedrock
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills and mountains
*Parent material:* Local colluvium and residuum from granite
*Slope range:* 35 to 60 percent
*Elevation range:* 6,400 to 7,000 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Haplocryalfs

### Typical Pedon

Tepecreek very gravelly sandy clay loam, in an area of Bobowic, very bouldery-Rock outcrop-Tepecreek, very bouldery, complex, 25 to 60 percent slopes; in a forested area, 1,350 feet south and 1,475 feet west of the northeast corner of sec. 32, T. 9 N., R. 2 W.; Jefferson County, Montana.

Oi—0 to 1 inch; forest litter of partially decomposed needles, twigs, and leaves.
A—1 to 3 inches; grayish brown (10YR 5/2) very gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; few medium and many very fine and fine tubular pores; 35 percent granite gravel; slightly acid; clear smooth boundary.
E—3 to 9 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; few medium and many very fine and fine tubular pores; 40 percent granite gravel; slightly acid; clear smooth boundary.
Bt—9 to 19 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure;

slightly hard, friable, moderately sticky, slightly plastic; few fine and medium and many very fine roots; few fine and many very fine tubular pores; many faint clay films bridging sand grains; 40 percent granite gravel; slightly acid; clear wavy boundary.

BC—19 to 36 inches; olive brown (2.5Y 4/4) very gravelly sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few fine and many very fine roots; few fine and many very fine tubular pores; 55 percent granite gravel; neutral; clear wavy boundary.

Cr—36 to 53 inches; light olive brown (2.5Y 5/4) decomposing granite bedrock (grus) that crushes to very gravelly loamy coarse sand.

R—53 inches; hard granite bedrock.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the argillic horizon:* 5 to 12 inches
*Depth to the Cr horizon:* 20 to 40 inches
*Depth to bedrock:* 40 to 60 inches
*Surface fragments:* 0.1 to 3 percent boulders

*A horizon*
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Coarse sandy loam or sandy clay loam
Clay content: 10 to 20 percent
Content of rock fragments: 5 to 35 percent gravel
Reaction: pH 6.1 to 7.3

*E horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Coarse sandy loam, sandy clay loam, or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 5 to 50 percent gravel (mostly less than 7 mm in diameter)
Reaction: pH 6.1 to 7.3

*Bt horizon*
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 20 to 30 percent
Content of rock fragments: 35 to 60 percent gravel (mostly less than 7 mm in diameter)
Reaction: pH 6.1 to 7.3

*BC horizon*
Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture: Coarse sandy loam or sandy loam
Clay content: 10 to 18 percent

Content of rock fragments: 35 to 60 percent gravel (mostly less than 10 mm in diameter)
Reaction: pH 6.1 to 7.3

## *Tetonview Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Stream terraces, flood plains, swales, and depressions
*Parent material:* Calcareous alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,800 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

### Typical Pedon

Tetonview loam, 0 to 4 percent slopes, in an area of rangeland, 300 feet east and 700 feet north of the southwest corner of sec. 29, T. 6 N., R. 9 W.

Oi—0 to 2 inches; partially decomposed organic mat.
A1—2 to 10 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak very fine and fine granular structure; hard, friable, nonsticky, slightly plastic; common medium and many very fine and fine roots; many very fine discontinuous irregular pores; strongly effervescent; moderately alkaline; clear smooth boundary.
A2—10 to 16 inches; very dark grayish brown (2.5Y 3/2) clay loam, light brownish gray (2.5Y 6/2) dry; weak fine subangular blocky structure parting to moderate very fine and fine granular; hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine discontinuous irregular pores; strongly effervescent; moderately alkaline; clear smooth boundary.
Bkg1—16 to 23 inches; grayish brown (2.5Y 5/2) clay loam, light gray (10YR 7/2) dry; weak fine and medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few very fine discontinuous irregular pores; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.
Bkg2—23 to 60 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few very fine discontinuous and irregular pores; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 16 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Depth to the calcic horizon:* 7 to 16 inches

*A1 horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 or 2

Clay content: 20 to 27 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 7.4 to 8.4

*A2 horizon*
Value: 4 to 6 dry; 2 or 3 moist
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

*Bkg1 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 0 to 10 percent gravel
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

*Bkg2 horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 1 or 2
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

## *Tewfel Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills
*Parent material:* Colluvium and slope alluvium from semiconsolidated shale
*Slope range:* 4 to 35 percent
*Elevation range:* 5,500 to 6,000 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Haplustolls

### Typical Pedon

Tewfel clay loam, in an area of Tewfel-Hackney complex, 4 to 15 percent slopes, in an area of rangeland, 1,900 feet east and 1,850 feet north of the southwest corner of sec. 34, T. 11 N., R. 12 W.; Granite County, Montana.

Ap—0 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

A—7 to 12 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; hard, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

Bw1—12 to 21 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.

2Bw2—21 to 30 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine tubular pores; neutral; clear smooth boundary.

Cr—30 to 60 inches; semiconsolidated shale.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 10 to 15 inches
*Depth to the Cr horizon:* 20 to 40 inches

*A horizons*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 27 to 35 percent
Reaction: pH 6.6 to 7.3

*Bw1 horizon*
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Reaction: pH 6.6 to 7.3

*2Bw2 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, clay loam, or silty clay
Clay content: 25 to 45 percent
Content of rock fragments: 0 to 10 percent channers
Reaction: pH 6.6 to 7.3

## *Tibkey Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Drainageways
*Parent material:* Alluvium
*Slope range:* 1 to 4 percent
*Elevation range:* 6,300 to 6,800 feet
*Annual precipitation:* 15 to 24 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Fluvaquentic Haplocryolls

## Typical Pedon

Tibkey mucky silt loam, in an area of Marcel, very bouldery-Tibkey, bouldery, complex, 2 to 8 percent slopes, in an area of rangeland, 1,700 feet north and 350 feet east of the southwest corner of sec. 1, T. 4 N., R. 4 W.; Jefferson County, Montana.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) mucky silt loam, very dark brown (10YR 2/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; 10 percent gravel; slightly acid; clear wavy boundary.

A2—2 to 8 inches; very dark gray (10YR 3/1) mucky-silt loam, black (10YR 2/1) moist; strong medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 10 percent gravel; neutral; clear wavy boundary.

Bw1—8 to 13 inches; grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 40 percent gravel; neutral; clear wavy boundary.

Bw2—13 to 25 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 5 percent cobbles; 30 percent gravel; neutral; gradual wavy boundary.

Bw3—25 to 32 inches; light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist; few fine distinct yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; 5 percent cobbles; 30 percent gravel; neutral; gradual irregular boundary.

BC—32 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; common fine prominent strong brown (7.5YR 5/6) redox concentrations; massive; slightly hard, very friable, slightly sticky, nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 5 percent cobbles; 40 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 42 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 8 to 15 inches
*Depth to the seasonal high water table:* 24 to 42 inches

*A horizons*
- Hue: 10YR or 2.5Y
- Value: 2 to 4 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 15 to 27 percent
- Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel
- Reaction: pH 6.1 to 7.3

*Bw1 and Bw2 horizons*
- Hue: 10YR or 2.5Y
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 or 3

Texture: Silt loam, clay loam, sandy clay loam, or loam
Clay content: 18 to 30 percent
Content of rock fragments: 15 to 50 percent—0 to 15 percent boulders, stones, and cobbles; 15 to 40 percent gravel
Reaction: pH 6.6 to 7.3

*Bw3 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent stones and cobbles; 30 to 50 percent gravel
Reaction: pH 6.6 to 7.3

*BC horizon*
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Loam or sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel
Reaction: pH 6.6 to 7.8

## *Tibson Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Colluvium and slope alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 5,400 to 8,000 feet
*Annual precipitation:* 15 to 30 inches
*Annual air temperature:* 36 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Calcic Haplocryolls

### Typical Pedon

Tibson gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 1,500 feet north and 400 feet west of the southeast corner of sec. 18, T. 5 N., R. 13 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent gravel; neutral; clear smooth boundary.

Bw—6 to 12 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine discontinuous interstitial pores; 10 percent gravel; neutral; clear smooth boundary.

Bk1—12 to 18 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine

interstitial pores; 15 percent cobbles; 35 percent gravel; common soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—18 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; common very fine discontinuous interstitial pores; 15 percent cobbles; 35 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the calcic horizon:* 6 to 12 inches

*A horizon*
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 60 percent—0 to 15 percent stones; 0 to 25 percent cobbles; 10 to 45 percent gravel
Reaction: pH 6.1 to 7.8

*Bw horizon*
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 10 to 35 percent—0 to 15 percent cobbles; 10 to 20 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 6.6 to 8.4

*Bk1 horizon*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 30 to 60 percent—10 to 20 percent cobbles; 20 to 40 percent gravel
Calcium carbonate equivalent: 20 to 35 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

## *Tolbert Series*

*Depth class:* Shallow (10 to 20 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains

*Parent material:* Colluvium or residuum
*Slope range:* 8 to 70 percent
*Elevation range:* 3,500 to 6,800 feet
*Annual precipitation:* 15 to 23 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Argiustolls

### Typical Pedon

Tolbert very stony loam, in an area of Braziel-Tolbert complex, 15 to 35 percent slopes, in an area of rangeland, 1,500 feet east and 1,900 feet south of the northwest corner of sec. 21, T. 8 N., R. 8 W.; Powell County, Montana.

A—0 to 4 inches; brown (7.5YR 4/2) very stony loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 25 percent stones; 10 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.

Bt—4 to 12 inches; dark reddish brown (5YR 3/2) very gravelly loam, dark reddish brown (5YR 2/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; few faint clay films on faces of peds and lining pores; 15 percent cobbles; 35 percent gravel; slightly alkaline.

R—12 inches; fine-grained igneous bedrock.

### Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches or between 4 inches and the lithic contact if less than 12 inches
*Thickness of the mollic epipedon:* 7 to 14 inches
*Depth to bedrock:* 10 to 20 inches

*A horizon*
- Hue: 7.5YR, 10YR, or 2.5Y
- Value: 4 or 5 dry; 3 or 4 moist
- Chroma: 2 or 3
- Texture: Loam or clay loam
- Clay content: 15 to 35 percent
- Content of rock fragments: 25 to 80 percent—0 to 25 percent stones; 0 to 10 percent cobbles; 10 to 65 percent gravel
- Reaction: pH 6.1 to 7.8

*Bt horizon*
- Hue: 5YR, 7.5YR, 10YR, or 2.5Y
- Value: 3 to 5 dry; 2 to 4 moist
- Chroma: 2 to 4
- Texture: Loam, sandy clay loam, or clay loam
- Clay content: 20 to 35 percent
- Content of rock fragments: 35 to 65 percent—15 to 30 percent cobbles; 20 to 35 percent gravel
- Reaction: pH 6.1 to 7.8

## *Trapps Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained

*Permeability:* Moderately slow (0.2 to 0.6 inch/hour) to the Bk horizon, moderate (0.6 to 2.0 inches/hour) below
*Landform:* Mountains and moraines
*Parent material:* Colluvium or alluvium from limestone or till
*Slope range:* 8 to 60 percent
*Elevation range:* 4,000 to 6,500 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

## Typical Pedon

Trapps channery loam, 4 to 25 percent slopes, in an area of woodland, 2,100 feet east and 2,300 feet north of the southwest corner of sec. 15, T. 14 N., R. 10 W.; Powell County, Montana.

Oi—0 to 1 inch; partially decomposed forest litter.
E—1 to 7 inches; light gray (10YR 7/2) channery loam, brown (10YR 5/3) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; common coarse and many very fine and fine roots; many very fine and fine irregular pores; 10 percent stones; 5 percent cobbles; 20 percent channers; neutral; gradual smooth boundary.
Bt1—7 to 16 inches; reddish yellow (7.5YR 7/6) very channery clay loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine irregular pores; few faint clay films on faces of peds; 5 percent cobbles; 40 percent channers; slightly alkaline; clear smooth boundary.
Bt2—16 to 24 inches; reddish yellow (7.5YR 6/6) very channery clay loam, strong brown (7.5YR 5/6) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine irregular pores; many faint clay films on faces of peds; 5 percent cobbles; 45 percent channers; slightly alkaline; clear smooth boundary.
Bk—24 to 60 inches; yellow (10YR 8/8) extremely channery loam, yellowish brown (10YR 5/8) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 15 percent cobbles; 50 percent channers; disseminated lime; common distinct lime casts on undersides of coarse fragments; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 15 to 35 inches

*E horizon*
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Clay content: 10 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 20 percent boulders, stones, and cobbles or flagstones; 15 to 25 percent gravel or channers
Reaction: pH 5.6 to 7.3

*Bt horizons*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4 or 6
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel or channers
Reaction: pH 6.6 to 8.4

*Bk horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 5 or 6 moist
Chroma: 2 to 4, 6, or 8
Texture: Loam or sandy loam
Clay content: 10 to 15 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 35 to 50 percent gravel or channers
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 8.4

## *Truchot Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Calcareous alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 4,700 to 5,500 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Aquic Calciustolls

### Typical Pedon

Truchot gravelly loam, 0 to 4 percent slopes, in an area of pasture, 850 feet east and 500 feet south of the northwest corner of sec. 18, T. 5 N., R. 9 W.

A—0 to 9 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, moderately sticky, slightly plastic; few medium and many very fine and fine roots; many very fine and fine irregular pores; 15 percent gravel; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk1—9 to 18 inches; white (10YR 8/1) gravelly loam, gray (10YR 6/1) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine and fine irregular pores; 15 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—18 to 40 inches; white (10YR 8/1) very gravelly loam, light gray (10YR 7/1) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, moderately plastic; few very fine, fine, and medium roots; many very fine and fine irregular pores; 10 percent cobbles; 40 percent gravel; many distinct masses and seams of lime, many faint lime casts on rock fragments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk3—40 to 60 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; many medium and coarse distinct dark

yellowish brown (10YR 4/6) redox concentrations; single grain; loose, nonsticky, nonplastic; many very fine and fine irregular pores; 10 percent cobbles; 50 percent gravel; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the seasonal high water table:* 24 to 42 inches

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 27 percent
Content of rock fragments: 15 to 35 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*Bk1 horizon*
Value: 5 to 8 dry; 3 to 6 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 15 to 60 percent—0 to 10 percent cobbles; 15 to 50 percent gravel
Calcium carbonate equivalent: 10 to 35 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 65 percent—5 to 10 percent cobbles; 30 to 55 percent gravel
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

*Bk3 horizon*
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 1 to 4
Texture: Sandy loam, loam, or clay loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 65 percent—5 to 10 percent cobbles; 30 to 55 percent gravel
Calcium carbonate equivalent: 10 to 30 percent
Reaction: pH 7.9 to 8.4

## *Turrah Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Slow (0.06 to 0.20 inch/hour)
*Landform:* Stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 4 percent
*Elevation range:* 3,800 to 5,800 feet

*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine, mixed, superactive, frigid Cumulic Endoaquolls

## Typical Pedon

Turrah silty clay loam, 0 to 4 percent slopes, in an area of pasture, 2,000 feet west and 1,800 feet south of the northeast corner of sec. 31, T. 13 N., R. 10 W.; Powell County, Montana.

Oe—0 to 2 inches; partially decomposed organic matter.

A1—2 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

A2—10 to 14 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, moderately sticky, very plastic; common very fine and fine roots; common very fine and fine tubular pores; neutral; clear smooth boundary.

Bg1—14 to 27 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, very plastic; common very fine and fine roots; common very fine and fine tubular pores; slightly alkaline; clear smooth boundary.

Bg2—27 to 40 inches; dark gray (10YR 4/1) silty clay; gray (10YR 5/1) dry; common fine and medium distinct dark yellowish brown (10YR 4/4) dry redox concentrations; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, very plastic; common very fine and fine roots; common very fine tubular pores; slightly alkaline; abrupt smooth boundary.

2Cg—40 to 60 inches; dark grayish brown (2.5Y 4/2) very gravelly sandy clay loam; grayish brown (2.5Y 5/2) dry; common medium distinct dark yellowish brown (10YR 4/6) dry redox concentrations; massive; very hard, firm, moderately sticky, very plastic; 40 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 24 to 48 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Depth to the 2C horizon:* 24 to 48 inches

*A1 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4 dry; 2, 2.5, or 3 moist
Chroma: 1 or 2
Clay content: 27 to 40 percent
Reaction: pH 5.6 to 7.3

*A2 horizon*
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4 dry; 2, 2.5, or 3 moist
Chroma: 1 or 2
Texture: Clay, silty clay loam, or silty clay

Clay content: 35 to 60 percent
Reaction: pH 5.6 to 7.3

*Bg horizons*
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 dry; 2, 2.5, 3 to 5 moist
Chroma: 1 to 3
Texture: Clay, silty clay loam, or silty clay
Clay content: 35 to 60 percent
Reaction: pH 6.6 to 7.8

*2Cg horizon*
Hue: 2.5Y or 5Y
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Sandy clay loam or clay loam
Clay content: 20 to 40 percent
Content of rock fragments: 35 to 60 percent gravel
Reaction: pH 6.6 to 7.8

## *Varney Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans and stream terraces
*Parent material:* Alluvium
*Slope range:* 0 to 60 percent
*Elevation range:* 4,000 to 5,800 feet
*Annual precipitation:* 10 to 14 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Calcidic Argiustolls

### Typical Pedon

Varney sandy clay loam, 4 to 8 percent slopes, in an area of rangeland, 1,750 feet south and 600 feet west of the northeast corner of sec. 9, T. 5 N., R. 9 W.

A—0 to 4 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; neutral; clear smooth boundary.

Bt—4 to 9 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine discontinuous interstitial pores; common distinct clay bridging between sand grains; 5 percent gravel; slightly alkaline; clear smooth boundary.

Bk1—9 to 19 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine interstitial pores; 10 percent gravel; many medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—19 to 60 inches; very pale brown (10YR 7/4) gravelly sandy loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, slightly sticky,

slightly plastic; few very fine and fine roots; few very fine and fine discontinuous interstitial pores; 15 percent gravel; many medium masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches; dry in all parts between four tenths and five tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher
*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the Bk horizon:* 9 to 20 inches
*Note:* Some pedons have a BC or C horizon.

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam, clay loam, sandy clay loam, or sandy loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel
Reaction: pH 6.6 to 7.8

*Bt horizon*
Value: 4 to 6 dry; 3 to 5 moist
Hue: 2 to 4
Texture: Clay loam or sandy clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 6.6 to 7.8

*Bk horizons*
Value: 5 to 7 dry; 4 to 6 moist
Hue: 2 to 4
Texture: Sandy loam, loam, or sandy clay loam
Clay content: 10 to 30 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.4 to 8.4

## *Vitroff Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountain slopes
*Parent material:* Colluvium from tuff or rhyolite
*Slope range:* 15 to 35 percent
*Elevation range:* 6,200 to 7,700 feet
*Annual precipitation:* 20 to 30 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive Vitrandic Haplocryalfs

## Typical Pedon

Vitroff ashy loam, in an area of Vitroff-Torpy loams, 35 to 60 percent slopes, in an area of forestland, 800 feet east and 450 feet north of the southwest corner of sec. 22, T. 6 N., R. 6 W.; Jefferson County, Montana.

Oi—0 to 1 inch; forest litter of slightly decomposed needles, twigs, and roots.

E1—1 to 3 inches; light brownish gray (10YR 6/2) ashy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; 2 percent angular gravel; slightly acid; clear smooth boundary.

E2—3 to 8 inches; very pale brown (10YR 7/3) ashy loam, dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; 10 percent angular gravel; neutral; clear smooth boundary.

Bt and E—8 to 15 inches; B part: (65 percent) is brown (10YR 4/3) gravelly ashy clay loam, very dark grayish brown (2.5Y 3/2) moist; E part (35 percent) is very pale brown (10YR 7/3) ashy sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; B part is hard, firm, moderately sticky, moderately plastic; E part is slightly hard, friable, slightly sticky, slightly plastic; few coarse and common very fine, fine, and medium roots; few fine and common very fine tubular pores; 5 percent angular cobbles; 20 percent gravel; neutral; gradual wavy boundary.

Bt—15 to 33 inches; pale brown (10YR 6/3) gravelly ashy clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; common faint clay films on faces of peds; 10 percent angular cobbles; 20 percent gravel; neutral; diffuse wavy boundary.

BC—33 to 60 inches; light gray (10YR 7/2) extremely gravelly ashy coarse sandy loam, olive brown (2.5Y 4/3) moist; massive; loose, nonsticky, nonplastic; few very fine and fine roots in the upper 2 feet; 20 percent angular cobbles; 50 percent gravel; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to lamellae:* 6 to 20 inches
*Volcanic glass:* 20 to 50 percent in the coarse silt and sand fraction
*Acid oxalate extractable Fe + Al:* 0.12 to 0.20 percent

*E horizons*

Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 60 percent—0 to 20 percent angular cobbles; 0 to 40 percent gravel
Reaction: pH 5.6 to 7.3

*Bt and E horizon*

Hue: 10YR or 2.5Y
Value: B part: 4 or 5 dry; 3 or 4 moist; E part: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3

Texture: B part: Ashy clay loam or ashy sandy clay loam; E part: Ashy sandy clay loam or ashy sandy loam
Clay content: B part: 20 to 35 percent; E part: 15 to 24 percent
Content of rock fragments: 5 to 35 percent—0 to 5 percent angular cobbles; 5 to 30 percent gravel
Reaction: pH 6.1 to 7.3

*Bt horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Ashy clay loam or ashy sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 10 to 35 percent—0 to 10 percent angular cobbles; 10 to 25 percent gravel
Reaction: pH 6.1 to 7.3

*BC horizon*
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 85 percent—5 to 20 percent angular cobbles; 30 to 65 percent gravel
Reaction: pH 6.6 to 7.8

## *Waldbillig Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Moraines
*Parent material:* Volcanic ash over till
*Slope range:* 2 to 50 percent
*Elevation range:* 5,800 to 9,000 feet
*Annual precipitation:* 30 to 40 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Eutrocryepts

### Typical Pedon

Waldbillig gravelly ashy loam, 2 to 8 percent slopes, in an area of forestland, 800 feet south and 400 feet west of the northeast corner of sec. 9, T. 4 N., R. 13 W.

Oe—0 to 2 inches; partly decomposed forest matter.
Bw—2 to 10 inches; yellowish brown (10YR 5/4) gravelly ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; many fine interstitial pores; 5 percent cobbles; 15 percent gravel; moderately acid; clear wavy boundary.
2E—10 to 21 inches; pale brown (10YR 6/3) very cobbly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and few medium roots; common fine interstitial pores; 30 percent cobbles; 20 percent gravel; moderately acid; clear wavy boundary.

2E and Bt1—21 to 33 inches; E part (80 percent) is light yellowish brown (2.5Y 6/4) very cobbly sandy loam, light olive brown (2.5Y 5/4) moist; B part (20 percent) is brown (7.5YR 5/4) very cobbly very fine sandy loam lamellae 1/8- to 1/4-inch thick, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and medium and common very fine roots; common fine interstitial pores; 30 percent cobbles; 25 percent gravel; slightly acid; clear wavy boundary.

2E and Bt2—33 to 60 inches; E part (90 percent) is light brownish gray (2.5Y 6/2) very cobbly sandy loam, dark grayish brown (2.5Y 4/2) moist; B part (10 percent) is brown (7.5YR 5/4) very cobbly sandy loam lamellae 1/4- to 1/2-inch thick, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; common fine interstitial pores; 30 percent cobbles; 25 percent gravel; slightly acid.

### Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 8 and 24 inches
*Surface fragments:* 0 to 0.1 percent boulders

*Bw horizon*
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Ashy loam, ashy fine sandy loam, or ashy very fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent boulders, stones, and cobbles; 15 to 25 percent gravel
Acid oxalate extractable Al + 1/2 Fe: More than 1 percent
Moist bulk density: 1 g/cm$^3$ or less
Reaction: pH 5.6 to 6.5

*2E horizon*
Hue: 5YR, 7.5YR, or 10YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 or 3
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 7 to 18 percent
Content of rock fragments: 35 to 60 percent—5 to 30 percent boulders, stones, and cobbles; 20 to 50 percent gravel
Reaction: pH 5.6 to 6.5

*2E and Bt horizons*
Hue: E part: 5YR, 7.5YR, 10YR, or 2.5Y; B part: 5YR or 7.5YR
Value: E part: 5 to 7 dry; 4 to 6 moist; B part: 5 or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture, mixed: Fine sandy loam, sandy loam, or loam
Clay content: 7 to 18 percent; lamellae has less than 3 percent clay increase
Content of rock fragments: 35 to 60 percent—5 to 30 percent boulders, stones, and cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Wetsand Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour) to the 2C2 horizon, very rapid (greater than 20 inches/hour) below
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 4,200 to 6,000 feet
*Annual precipitation:* 10 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Aeric Fluvaquents

## Typical Pedon

Wetsand loam, in an area of Carten-Wetsand complex, 0 to 2 percent slopes, rarely flooded, in an area of pasture, 1,200 feet south and 2,850 feet east of the northwest corner of sec. 2, T. 7 N., R. 10 W.; Powell County, Montana.

Oe—0 to 2 inches; decomposed organic matter.
A—2 to 8 inches; gray (10YR 6/1) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many fine irregular pores; 5 percent gravel; moderately alkaline; clear smooth boundary.
AC—8 to 15 inches; light brownish gray (10YR 6/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many fine irregular pores; 20 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.
C1—15 to 20 inches; light gray (10YR 7/2) very gravelly sandy loam, grayish brown (10YR 5/2) moist; common fine prominent reddish yellow (5YR 6/6) redox concentrations; massive; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many fine irregular pores; 10 percent cobbles; 25 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.
2C2—20 to 60 inches; very pale brown (10YR 8/2) very gravelly coarse sand; light gray (10YR 7/2) moist; massive; loose, nonsticky, nonplastic; common fine and medium roots; many fine irregular pores; 15 percent cobbles; 30 percent gravel; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the 2C2 horizon:* 12 to 20 inches
*Depth to the seasonal high water table:* 12 to 24 inches

*A horizon*
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 1 to 3
Clay content: 10 to 25 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

*AC horizon*
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Sandy loam or loam

Clay content: 10 to 25 percent
Content of rock fragments: 0 to 20 percent gravel
Reaction: pH 7.4 to 8.4

*C1 horizon*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Sandy loam or loam
Clay content: 5 to 20 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 7.4 to 8.4

*2C2 horizon*
Value: 5 to 8 dry; 4 to 7 moist
Chroma: 2 or 3
Texture: Loamy sand, sand, or coarse sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 80 percent—5 to 20 percent cobbles; 30 to 60 percent gravel
Reaction: pH 7.4 to 8.4

## *Whitecow Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium from limestone
*Slope range:* 15 to 60 percent
*Elevation range:* 4,000 to 8,600 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid Typic Calciustepts

### Typical Pedon

Whitecow gravelly loam, 35 to 60 percent slopes, in an area of woodland, 1,050 feet north of the southeast corner of sec. 22, T. 5 N., R. 12 W.

A—0 to 6 inches; light brownish gray (10YR 6/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 10 percent cobbles; 15 percent gravel; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—6 to 16 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 10 percent cobbles; 35 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—16 to 32 inches; light brownish gray (10YR 6/2) very cobbly loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 20 percent cobbles; 15 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

Bk3—32 to 60 inches; light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent cobbles; 40 percent gravel; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the calcic horizon:* 5 to 20 inches

*A horizon*
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Calcium carbonate equivalent: 0 to 45 percent
Reaction: pH 7.4 to 8.4

*Bk1 horizon*
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent gravel
Calcium carbonate equivalent: 40 to 50 percent
Reaction: pH 7.4 to 9.0

*Bk2 horizon*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 25 to 60 percent—10 to 20 percent cobbles; 15 to 40 percent gravel
Calcium carbonate equivalent: 40 to 50 percent
Reaction: pH 7.4 to 9.0

*Bk3 horizon*
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 35 to 70 percent—10 to 25 percent cobbles; 25 to 45 percent gravel
Calcium carbonate equivalent: 40 to 50 percent
Reaction: pH 7.4 to 9.0

## *Whitore Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains

*Parent material:* Colluvium from limestone
*Slope range:* 2 to 80 percent
*Elevation range:* 5,200 to 8,600 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 36 to 39 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, carbonatic Typic Eutrocryepts

## Typical Pedon

Whitore cobbly loam, 35 to 60 percent slopes, in an area of woodland, 3,100 feet east and 2,300 feet south of the northwest corner of sec. 21, T. 5 N., R. 13 W.

Oi—0 to 1 inch; forest litter.

A—1 to 3 inches; grayish brown (10YR 5/2) cobbly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine tubular pores; 10 percent cobbles; 10 percent gravel; neutral; clear smooth boundary.

Bw—3 to 7 inches; light brownish gray (10YR 6/2) very gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; common very fine tubular pores; 10 percent cobbles; 25 percent gravel; neutral; clear smooth boundary.

Bk1—7 to 10 inches; grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 15 percent cobbles; 30 percent gravel; common soft masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—10 to 22 inches; light gray (10YR 7/2) very channery loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 30 percent gravel; 25 percent channers; many fine soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—22 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few coarse and many very fine and fine roots; common very fine tubular pores; 40 percent gravel; 15 percent channers; disseminated lime; violently effervescent; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 41 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 5 to 15 inches

*A horizon*

Value: 4 or 5 dry; 2 to 4 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 15 to 35 percent—10 to 20 percent stones and cobbles; 5 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Bw horizon*

Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 to 4

Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 15 to 50 percent—5 to 15 percent cobbles; 10 to 35 percent gravel
Reaction: pH 6.6 to 8.4

*Bk horizons*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 85 percent—0 to 40 percent stones and cobbles; 25 to 65 percent gravel or channers
Calcium carbonate equivalent: 40 to 50 percent
Reaction: pH 7.4 to 9.0

## *Wilspring Series*

*Depth class:* Moderately deep (20 to 40 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Hills and mountains
*Parent material:* Colluvium from hard brown shale or argillaceous limestone
*Slope range:* 15 to 75 percent
*Elevation range:* 4,920 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts

### Typical Pedon

Wilspring very gravelly loam, in an area of Wilspring-Rubble land complex, 50 to 75 percent slopes, in an area of rangeland, 2,000 feet west and 700 feet south of the northeast corner of sec. 15, T. 5 N., R. 11 W.

A—0 to 4 inches; light olive brown (2.5Y 5/3) very gravelly loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; few very fine tubular and common very fine irregular pores; 40 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—4 to 7 inches; light yellowish brown (2.5Y 6/3) very channery clay loam, brown (10YR 4/3) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine, fine, and medium roots; common very fine irregular pores; 45 percent channers; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk—7 to 15 inches; light yellowish brown (2.5Y 6/3) very channery loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine, fine, and medium roots; common very fine irregular pores; 50 percent channers; disseminated lime; common distinct lime coats on undersides of fragments; slightly effervescent; moderately alkaline; abrupt smooth boundary.

BCk—15 to 28 inches; light yellowish brown (2.5Y 6/3) very channery loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common fine and medium

irregular pores; 60 percent channers; disseminated lime; common distinct lime coats on undersides of fragments; violently effervescent; moderately alkaline; gradual smooth boundary.

R—28 inches; brown (10YR 5/3) hard fractured shale.

### Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 7 to 10 inches
*Depth to bedrock:* 20 to 40 inches

*A horizon*
Value: 4 or 5 dry
Chroma: 2 to 4
Clay content: 15 to 27 percent
Content of rock fragments: 15 to 45 percent—0 to 5 percent flagstones; 15 to 40 percent gravel or channers
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 7.4 to 8.4

*Bw horizon*
Value: 5 or 6 dry
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 15 to 45 percent—0 to 5 percent flagstones; 15 to 45 percent channers
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*Bk and BCk horizons*
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 3, 4 to 6
Texture: Loam or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 80 percent—0 to 10 percent flagstones; 30 to 70 percent channers
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

## *Wimper Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium and alluvium
*Slope range:* 4 to 60 percent
*Elevation range:* 5,000 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

## Typical Pedon

Wimper gravelly loam, in an area of Wimper-Winspect complex, 15 to 35 percent slopes, in an area of rangeland, 2,250 feet south and 1,150 feet east of the northwest corner of sec. 15, T. 7 N., R. 15 W.; Granite County, Montana.

A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine irregular pores; 15 percent gravel; neutral; clear smooth boundary.

Bw1—5 to 8 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; 15 percent gravel; neutral; clear smooth boundary.

Bw2—8 to 13 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and many very fine roots; common very fine tubular pores; 40 percent gravel; neutral; clear smooth boundary.

Bk1—13 to 23 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; common fine tubular pores; 5 percent cobbles; 45 percent gravel; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—23 to 60 inches; very pale brown (10YR 8/3) very gravely loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; 15 percent cobbles; 35 percent gravel; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 39 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches
*Depth to the Bk horizon:* 10 to 15 inches

*A horizon*
- Hue: 7.5YR or 10YR
- Value: 3 to 5 dry; 2 or 3 moist
- Chroma: 1 to 3
- Clay content: 15 to 27 percent
- Content of rock fragments: 0 to 15 percent gravel
- Reaction: pH 6.6 to 7.8

*Bw horizons*
- Hue: 7.5YR or 10YR
- Value: 4 to 6 dry; 3 to 5 moist
- Chroma: 2 to 4
- Clay content: 15 to 27 percent
- Content of rock fragments: 15 to 50 percent—0 to 10 percent cobbles; 15 to 40 percent gravel
- Reaction: pH 6.6 to 7.8

*Bk horizons*
- Hue: 7.5YR, 10YR, or 2.5Y
- Value: 5 to 8 dry; 4 to 6 moist
- Chroma: 2 or 3
- Clay content: 15 to 27 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent gravel
Calcium carbonate equivalent: 5 to 25 percent
Reaction: pH 7.9 to 8.4

## *Windham Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderate (0.6 to 2.0 inches/hour)
*Landform:* Alluvial fans, stream terraces, and mountains
*Parent material:* Alluvium and colluvium from limestone
*Slope range:* 8 to 60 percent
*Elevation range:* 5,000 to 6,400 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid Typic Calciustolls

### Typical Pedon

Windham gravelly loam, in an area of Winspect gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 700 feet north and 100 feet west of the southeast corner of sec. 22, T. 5 N., R. 12 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; 25 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—8 to 22 inches; light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine interstitial pores; 50 percent gravel; disseminated lime; common very fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—22 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine interstitial pores; 50 percent gravel; disseminated lime; few very fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the calcic horizon:* 7 to 10 inches
*Thickness of the mollic epipedon:* 7 to 10 inches
*Surface fragments:* 0 to 3 percent stones

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 27 percent
Content of rock fragments: 10 to 35 percent—0 to 5 percent cobbles; 10 to 30 percent gravel

Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*Bk1 horizon*
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 10 to 75 percent—0 to 20 percent cobbles; 10 to 55 percent gravel)
Calcium carbonate equivalent: 35 to 60 percent
Reaction: pH 7.9 to 8.4

*Bk2 horizon*
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy loam
Clay content: 18 to 35 percent
Content of rock fragments: 40 to 75 percent—0 to 20 percent cobbles; 35 to 55 percent gravel
Calcium carbonate equivalent: 40 to 60 percent
Reaction: pH 7.9 to 8.4

## *Winkler Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Somewhat excessively drained
*Permeability:* Moderately rapid (2 to 6 inches/hour)
*Landform:* Mountains
*Parent material:* Colluvium
*Slope range:* 8 to 60 percent
*Elevation range:* 4,000 to 6,700 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 43 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

### Typical Pedon

Winkler gravelly loam, 35 to 60 percent slopes, in an area of woodland, 2,400 feet west and 1,600 feet south of the northeast corner of sec. 7, T. 12 N., R. 9 W.; Powell County, Montana.

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
A—2 to 5 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; many fine tubular pores; 30 percent angular gravel; neutral; clear smooth boundary.
E1—5 to 15 inches; very pale brown (10YR 7/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine and medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; many fine tubular pores; 30 percent angular gravel; moderately acid; gradual wavy boundary.
E2—15 to 28 inches; pink (7.5YR 8/4) very gravelly sandy loam, light brown (7.5YR 6/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many fine tubular pores;

10 percent angular cobbles; 40 percent angular gravel; moderately acid; gradual wavy boundary.

E and Bt—28 to 43 inches; E part (75 percent) is pinkish white (7.5YR 8/2) extremely gravelly sandy loam, brown (7.5YR 5/4) moist; B part (25 percent) is brown (7.5YR 5/4) fine sandy loam lamellae 1/8- to 1/4-inch thick, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few fine and medium roots; common very fine and fine tubular pores; 20 percent angular cobbles; 50 percent angular gravel; moderately acid; gradual wavy boundary.

C—43 to 60 inches; pinkish gray (7.5YR 7/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; few fine tubular pores; 20 percent angular cobbles; 55 percent angular gravel; moderately acid.

## Range in Characteristics

*Soil temperature:* 45 to 47 degrees F
*Moisture control section:* Between 8 and 24 inches

*A horizon*
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent angular cobbles; 15 to 30 percent gravel
Reaction: pH 6.1 to 7.3

*E horizons*
Hue: 7.5YR or 10YR
Value: 6 to 8 dry; 4 to 7 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 70 percent—0 to 10 percent angular cobbles; 15 to 60 percent angular gravel
Reaction: pH 5.6 to 7.3

*E and Bt horizon*
Hue: 7.5YR or 10YR
Value: E part: 6 to 8 dry; 4 to 7 moist; B part: 4 to 6 dry; 4 or 5 moist
Chroma: E part: 2 to 4; B part: 3 or 4
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 85 percent—10 to 25 percent angular cobbles; 50 to 60 percent angular gravel
Reaction: pH 5.6 to 6.5

*C horizon*
Hue: 7.5YR or 10YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 85 percent—10 to 25 percent angular cobbles; 50 to 60 percent angular gravel
Reaction: pH 5.6 to 6.5

## *Winspect Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains, moraines, and alluvial fans
*Parent material:* Till, alluvium, or colluvium from limestone
*Slope range:* 4 to 60 percent
*Elevation range:* 5,000 to 6,600 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Calciustolls

### Typical Pedon

Winspect gravelly loam, 15 to 35 percent slopes, in an area of rangeland, 450 feet east and 600 feet north of the southwest corner of sec. 2, T. 7 N., R. 14 W.; Granite County, Montana.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine interstitial pores; 5 percent cobbles; 15 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

Ak—6 to 11 inches; grayish brown (10YR 5/2) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine interstitial pores; 5 percent cobbles; 25 percent gravel; disseminated lime; few fine masses of lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—11 to 20 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine tubular pores; 10 percent cobbles; 30 percent gravel; disseminated lime; common distinct lime casts on undersides of coarse fragments; violently effervescent; strongly alkaline; clear smooth boundary.

Bk2—20 to 28 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; few very fine roots; few very fine tubular pores; 10 percent cobbles; 30 percent gravel; disseminated lime; common distinct lime casts on undersides of coarse fragments; violently effervescent; strongly alkaline; gradual wavy boundary.

BC—28 to 60 inches; pale yellow (2.5Y 7/4) very gravelly loam, light yellowish brown (2.5Y 6/4) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; common very fine interstitial pores; 10 percent cobbles; 35 percent gravel; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 14 inches

*A horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 25 percent
Content of rock fragments: 15 to 30 percent—5 to 10 percent cobbles; 15 to 20 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

*Ak horizon*
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Content of rock fragments: 20 to 35 percent—5 to 10 percent cobbles; 15 to 25 percent gravel
Calcium carbonate equivalent: 10 to 40 percent
Reaction: pH 7.4 to 8.4

*Bk1 and Bk2 horizons*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 50 percent—10 to 20 percent cobbles; 25 to 30 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 9.0

*BC horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 40 to 55 percent—10 to 20 percent cobbles; 30 to 35 percent gravel
Calcium carbonate equivalent: 15 to 40 percent
Reaction: pH 7.9 to 9.0

## *Work Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Hills
*Parent material:* Alluvium
*Slope range:* 2 to 60 percent
*Elevation range:* 4,920 to 6,400 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, smectitic, frigid Typic Argiustolls

## Typical Pedon

Work cobbly loam, in an area of Work-Tolbert-Rock outcrop complex, 35 to 60 percent slopes, severely impacted, in an area of rangeland, 1,650 feet east and 850 feet north of the southwest corner of sec. 31, T. 5 N., R. 10 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark gray (10YR 3/1) moist; weak very thin platy structure; soft, very friable, moderately sticky, moderately plastic; few very fine vesicular pores; 10 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.

Bt1—5 to 15 inches; brown (10YR 4/3) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, firm, moderately sticky, very plastic; few very fine dead roots; few very fine tubular pores; common distinct clay films lining pores; 10 percent cobbles; 15 percent gravel; slightly acid; clear smooth boundary.

Bt2—15 to 29 inches; yellowish brown (10YR 5/4) clay, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak fine subangular blocky; very hard, very firm, very sticky, very plastic; few coarse and common very fine and fine dead roots; few very fine tubular pores; common distinct clay films on faces of peds; 10 percent cobbles; 2 percent gravel; neutral; clear smooth boundary.

Btk—29 to 48 inches; light yellowish brown (10YR 6/4) very cobbly clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure; hard, friable, moderately sticky, very plastic; few very fine and fine dead roots; few very fine interstitial pores; few faint clay films on faces of peds; 5 percent stones; 20 percent cobbles; 25 percent gravel; common fine seams and threads of lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bk—48 to 60 inches; light yellowish brown (10YR 6/4) very cobbly clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine dead roots; few very fine interstitial pores; 5 percent stones; 20 percent cobbles; 25 percent gravel; common fine seams and threads of lime; strongly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 15 inches

*A horizon*

Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 to 3
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 60 percent—0 to 30 percent cobbles; 0 to 30 percent gravel or channers
Reaction: pH 6.1 to 7.8

*Bt horizons*

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 to 4
Texture: Clay loam, silty clay, or clay
Clay content: 35 to 50 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles or stones; 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

*Btk horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 30 to 45 percent
Content of rock fragments: 0 to 45 percent—0 to 25 percent stones and cobbles; 0 to 20 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

*Bk horizon*
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 2 to 4
Texture: Clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 45 percent—0 to 20 percent cobbles; 0 to 30 percent gravel; 0 to 5 percent stones
Calcium carbonate equivalent: 3 to 10 percent
Reaction: pH 7.4 to 8.4

## *Worock Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains
*Parent material:* Colluvium
*Slope range:* 4 to 85 percent
*Elevation range:* 5,500 to 8,600 feet
*Annual precipitation:* 20 to 40 inches
*Annual air temperature:* 36 to 45 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

### Typical Pedon

Worock gravelly loam, 15 to 35 percent slopes, in an area of woodland, 300 feet south and 730 feet west of the northeast corner of sec. 18, T. 2 N., R. 12 W.

Oe—0 to 1 inch; partially decomposed forest litter.
E—1 to 8 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine and fine irregular pores; 5 percent stones; 5 percent cobbles; 15 percent gravel; moderately acid; clear smooth boundary.
E/Bt—8 to 19 inches; E part (85 percent) is very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/6) moist; B part (15 percent) is yellowish brown (10YR 5/4) gravelly clay loam, yellowish brown (10YR 5/6) moist; weak medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; few medium

and many very fine and fine roots; many very fine irregular pores; few faint clay films on faces of peds; 5 percent stones; 5 percent cobbles; 25 percent gravel; moderately acid; clear smooth boundary.

Bt—19 to 29 inches; yellowish brown (10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure parting to weak medium granular; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine irregular pores; many distinct clay films on faces of peds; 5 percent stones; 10 percent cobbles; 30 percent gravel; moderately acid; clear smooth boundary.

BC—29 to 60 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; many very fine irregular pores; 5 percent stones; 15 percent cobbles; 35 percent gravel; moderately acid.

## Range in Characteristics

*Soil temperature:* 38 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches
*Surface fragments:* 0 to 0.1 percent stones
*Note:* Some pedons have Bt/E horizons.

*E horizon*
Value: 6 or 7 dry; 3 to 5 moist
Chroma: 2 to 4
Clay content: 15 to 27 percent
Content of rock fragments: 15 to 50 percent—5 to 20 percent stones; 0 to 15 percent cobbles; 5 to 30 percent gravel
Reaction: pH 5.1 to 6.5

*E/Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry; 3 to 5 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: E part: 2, 3, 4 to 6; B part: 4 to 6
Texture: E part: Loam or sandy loam; B part: Loam or clay loam (mixed)
Clay content: E part: 15 to 27 percent; B part: 27 to 30 percent; mixed 18 to 30 percent
Content of rock fragments: 20 to 60 percent—5 to 20 percent stones; 5 to 15 percent cobbles; 10 to 25 percent gravel
Reaction: pH 5.1 to 6.5

*Bt horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 4 to 6
Texture: Loam, clay loam, or sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 65 percent—0 to 10 percent stones; 5 to 15 percent cobbles; 25 to 45 percent gravel
Reaction: pH 5.6 to 6.5

*BC horizon*
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 3, 4, or 6
Texture: Loam, clay loam, or sandy clay loam
Clay content: 12 to 30 percent

Content of rock fragments: 35 to 60 percent—5 to 10 percent stones; 5 to 15 percent cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 6.5

## *Yreka Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Well drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Mountains and moraines
*Parent material:* Colluvium and till
*Slope range:* 8 to 60 percent
*Elevation range:* 4,000 to 6,700 feet
*Annual precipitation:* 18 to 25 inches
*Annual air temperature:* 37 to 43 degrees F
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

### Typical Pedon

Yreka gravelly loam, cool, 15 to 35 percent slopes, in an area of woodland, 900 feet north and 1,900 feet east of the southwest corner of sec. 2, T. 5 N., R. 11 W.

Oi—0 to 2 inches; undecomposed and partially decomposed twigs and needles.
E—2 to 11 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine and fine irregular pores; 5 percent cobbles; 20 percent gravel; neutral; clear smooth boundary.
E/Bt—11 to 18 inches; E part (60 percent) is light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; B part: (40 percent) is brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common medium and many very fine and fine roots; common very fine and fine irregular pores; 10 percent cobbles; 25 percent gravel; neutral; clear smooth boundary.
Bt1—18 to 29 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine and fine and common medium and coarse roots; common very fine and fine irregular pores; few faint clay films on faces of peds; 15 percent cobbles; 35 percent gravel; neutral; clear smooth boundary.
Bt2—29 to 60 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and common very fine and fine roots; common very fine irregular pores; few faint clay films on faces of peds; 20 percent cobbles; 35 percent gravel; neutral.

### Range in Characteristics

*Soil temperature:* 39 to 45 degrees F
*Moisture control section:* Between 4 and 12 inches

*E horizon*
Hue: 10YR or 7.5YR
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3

Clay content: 7 to 20 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.3

*E/Bt horizon*
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry; 5 or 6 moist; B part: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or sandy loam
Clay content: 7 to 25 percent, mixed
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent gravel
Reaction: pH 5.6 to 7.3

*Bt horizons*
Hue: 2.5Y, 10YR, or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent gravel
Reaction: pH 5.6 to 7.3

## *Zelda Series*

*Depth class:* Very deep (greater than 60 inches)
*Drainage class:* Poorly drained
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)
*Landform:* Flood plains
*Parent material:* Alluvium
*Slope range:* 0 to 2 percent
*Elevation range:* 5,800 to 6,100 feet
*Annual precipitation:* 15 to 19 inches
*Annual air temperature:* 36 to 37 degrees F
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive Typic Cryaqualfs

### Typical Pedon

Zelda loam, in an area of Zelda-Nana-Foolhen complex, 0 to 2 percent slopes, in an area of rangeland, 350 feet east and 500 feet north of the southwest corner of sec. 33, T. 1 N., R. 14 W.

A—0 to 4 inches; dark gray (10YR 4/1) loam, grayish brown (10YR 5/2) dry; moderate thick platy structure parting to moderate medium granular; slightly hard, friable, slightly sticky, slightly plastic; common medium and many fine roots; many very fine tubular pores; very strongly alkaline; clear smooth boundary.

E—4 to 9 inches; grayish brown (10YR 5/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and common fine roots; common fine and many very fine tubular pores; violently effervescent; very strongly alkaline; abrupt smooth boundary.

Btn1—9 to 14 inches; very dark grayish brown (10YR 3/2) sandy clay loam, grayish brown (10YR 5/2) dry; strong medium columnar structure; hard, firm, moderately sticky, moderately plastic; few medium and common very fine roots; common very fine tubular pores; many distinct clay films on faces of peds; common grayish brown (10YR 5/2) and light gray (10YR 7/2) moist tongues of albic materials on upper vertical faces of peds; very strongly alkaline; clear smooth boundary.

Btn2—14 to 21 inches; dark grayish brown (10YR 4/2) cobbly sandy clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; common very fine and fine roots; common very fine tubular pores; common distinct clay films on faces of peds; 15 percent cobbles; 10 percent gravel; very strongly alkaline; clear smooth boundary.

Cn1—21 to 34 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, grayish brown (10YR 5/2) dry; massive; slightly hard, firm, slightly sticky, slightly plastic; common very fine and fine roots; common fine and medium tubular pores; 5 percent cobbles; 10 percent gravel; very strongly alkaline; gradual smooth boundary.

Cn2—34 to 44 inches; brown (10YR 5/3) sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, firm, slightly sticky, slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; very strongly alkaline; gradual smooth boundary.

2Cn3—44 to 60 inches; brown (10YR 5/3) very cobbly loamy sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky, nonplastic; 20 percent cobbles; 30 percent gravel; very strongly alkaline.

## Range in Characteristics

*Soil temperature:* 38 to 39 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the seasonal high water table:* 12 to 24 inches
*Depth to the 2C horizon:* 40 to 60 inches

A horizon
- Value: 5 to 7 dry; 4 to 6 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Electrical conductivity: 0 to 2 mmhos/cm
- Sodium adsorption ratio: 30 to 40
- Calcium carbonate equivalent: 0 to 5 percent
- Reaction: pH 8.5 to 9.6

E horizon
- Value: 6 to 8 dry; 5 or 6 moist
- Chroma: 1 or 2
- Texture: Loamy fine sand or silt loam
- Clay content: 10 to 18 percent
- Electrical conductivity: 0 to 2 mmhos/cm
- Sodium adsorption ratio: 30 to 40
- Calcium carbonate equivalent: 0 to 5 percent
- Reaction: pH 9.1 to 9.6

Btn1 horizon
- Hue: 10YR or 2.5Y
- Value: 5 to 7 dry; 3 to 6 moist
- Chroma: 1 or 2
- Texture: Sandy clay loam or clay loam

Clay content: 27 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Electrical conductivity: 1 to 3 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.1 to 9.6

*Btn2 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 to 6 moist
Chroma: 1 to 3
Texture: Sandy clay loam or clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Electrical conductivity: 1 to 3 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.1 to 9.6

*Cn1 and Cn2 horizons*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Sandy loam, very fine sandy loam, or sandy clay loam
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 9.1 to 9.6

*2Cn3 horizon*
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Texture: Loamy sand, sand, or loamy coarse sand
Clay content: 0 to 10 percent
Content of rock fragments: 40 to 60 percent—0 to 5 percent stones; 15 to 20 percent cobbles; 25 to 35 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 4 to 13
Reaction: pH 9.1 to 9.6

# Detailed Soil Map Units

The map units delineated on the detailed soil maps in 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.

A map unit delineation on a soil 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. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils 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 minor components that belong to taxonomic classes other than those of the major soils.

Most minor 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, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. 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 contrasting components are mentioned in the map unit descriptions. A few areas of minor components 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 of the soils and miscellaneous areas on the landscape.

The presence of minor components 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. If intensive use of small areas is planned, however, 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.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all of 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, Foolhen loam, 0 to 4 percent slopes, is a phase of the Foolhen series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes *complexes*. They consist 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. Varney-Con loams, 0 to 4 percent slopes, is an example.

This soil includes *associations*. They are made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Karloff-Coslaw-Illiano association, 8 to 35 percent slopes, moderately impacted, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Rock outcrop is an example.

The “Acreage and Proportionate Extent of the Soils” table gives the acreage and proportionate extent of each map unit. Other tables (see “Summary of Tables”) give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the “Glossary.”

## 2A—Dougcliff mucky peat, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 4,900 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Dougcliff and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,900 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Very long
*Available water capacity:* Mainly 20.7 inches

### Additional Components

Bushong and similar soils: 10 percent
Water: 5 percent

## 3B—Foolhen loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Foolhen and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 5,700 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Mooseflat and similar soils: 6 percent
Finn and similar soils: 5 percent
Dunkleber and similar soils: 4 percent

## 3C—Foolhen loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Foolhen and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 4 to 8 percent
*Elevation:* 5,700 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present

*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Mooseflat and similar soils: 6 percent
Dunkleber and similar soils: 5 percent
Finn and similar soils: 4 percent

## 6B—Elliston loam, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Elliston and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.5 inches

### Additional Components

Blossberg and similar soils: 5 percent
Kleinschmidt and similar soils: 4 percent
Carten and similar soils: 3 percent
Elliston, greater slope and similar soils: 3 percent

## 8B—Danielvil loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,020 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Danielvil and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,800 to 6,020 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Coarse-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.0 inches

### Additional Components

Maurice and similar soils: 10 percent
Adel and similar soils: 5 percent

## 15A—Dunkleber mucky peat, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Dunkleber and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 6,300 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic, unspecified
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Ponding duration:* Long
*Available water capacity:* Mainly 13.6 inches

### Additional Components

Foolhen and similar soils: 8 percent
Mooseflat and similar soils: 7 percent

## 16B—Maciver loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 6,350 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maciver and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Interfluve on hill
- Side slope on hill
- Mountainflank on mountain

*Slope:* 2 to 4 percent
*Elevation:* 6,350 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium or gravelly slope alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 13.5 inches

### Additional Components

Levengood and similar soils: 5 percent
Libeg and similar soils: 5 percent
Tibson and similar soils: 5 percent

## 20A—Dougcliff mucky peat, 0 to 2 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,900 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Dougcliff and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,900 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Very long
*Available water capacity:* Mainly 20.7 inches

### Additional Components

Bushong and similar soils: 10 percent
Water: 5 percent

## 20B—Eyerbow gravelly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,300 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eyerbow and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 15.7 inches

### Additional Components

Bridger and similar soils: 15 percent

## 20C—Eyerbow gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,100 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eyerbow and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.3 inches

### Additional Components

Bridger and similar soils: 15 percent

## 21C—Maurice loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maurice and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Libeg and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 21D—Maurice cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maurice and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 8 to 15 percent

*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Libeg and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 21E—Maurice cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,960 to 8,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maurice and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,960 to 8,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Libeg and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 22E—Lolon gravelly loam, 4 to 25 percent slopes, bouldery

### Map Unit Setting

*Elevation:* 6,100 to 6,300 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Lolon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Moraine

*Slope:* 4 to 25 percent
*Elevation:* 6,100 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent boulders
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

### Additional Components

Adel and similar soils: 5 percent
Finn and similar soils: 5 percent
Water: 5 percent

## 24B—Con loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.1 inches

### Additional Components

Con, very gravelly and similar soils: 10 percent
Saypo and similar soils: 5 percent

## 24C—Con loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Con, very gravelly and similar soils: 10 percent
Saypo and similar soils: 5 percent

## 24D—Con loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,700 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,700 to 5,700 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Anaconda and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent
Varney and similar soils: 5 percent

## 25B—Staad silty clay loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Staad and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Drainageway

Sl*ope:* 0 to 4 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 10.6 inches

### Additional Components

Martinsdale and similar soils: 5 percent
Perma and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 25D—Staad silty clay loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Staad and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Drainageway

Sl*ope:* 8 to 15 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 10.6 inches

### Additional Components

Martinsdale and similar soils: 5 percent
Perma and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 26C—Bearmouth gravelly loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bearmouth and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 2 to 4 percent
*Elevation:* 5,700 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Available water capacity:* Mainly 2.9 inches

### Additional Components

Mooseflat and similar soils: 10 percent
Foolhen and similar soils: 5 percent

## 30C—Quigg loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,250 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Quigg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,900 to 6,250 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Mollet and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 30D—Quigg loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,250 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Quigg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,900 to 6,250 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Mollet and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 30E—Quigg loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,250 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Quigg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 6,250 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Mollet and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 31B—Varney clay loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium

*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 31C—Varney clay loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches

### Additional Components

Beaverell and similar soils: 5 percent
Beaverell, cobbly and similar soils: 5 percent
Varney, cobbly and similar soils: 5 percent

## 31D—Varney clay loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 32E—Sula-Shook complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Sula and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Mountainflank on mountain
- Mountainbase on mountain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Shook and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountainbase on mountain
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam

*Depth to restrictive feature:* Bedrock (lithic): 30 to 40 inches
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

### Additional Components

Rock outcrop: 10 percent
Libeg and similar soils: 5 percent

## 32F—Sula-Shook complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Sula and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Shook and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountainbase on mountain
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 30 to 40 inches
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

### Additional Components

Rock outcrop: 10 percent
Libeg and similar soils: 5 percent

## 34B—Cetrack loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,800 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Cetrack and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Outwash plain
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,800 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium over sandy and gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent
Varney and similar soils: 5 percent

## 35B—Anaconda sandy loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 35C—Anaconda sandy loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 35D—Anaconda sandy loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 36B—Varney-Con loams, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 7.0 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Varney, clay loam and similar soils: 10 percent
Beaverell and similar soils: 5 percent

## 36C—Varney-Con loams, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Sixbeacon and similar soils: 4 percent
Anaconda and similar soils: 3 percent
Varney, clay loam and similar soils: 3 percent

## 36D—Varney-Con loams, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,500 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,000 to 5,500 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.0 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,000 to 5,500 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Varney, clay loam and similar soils: 10 percent
Con, cobbly and similar soils: 5 percent

## 36E—Varney-Con loams, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Sixbeacon and similar soils: 4 percent
Anaconda and similar soils: 3 percent
Varney, clay loam and similar soils: 3 percent

## 36F—Varney-Con loams, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 4,700 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Anaconda and similar soils: 5 percent
Cetrack and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 37C—Adel loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,100 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Adel and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Drainageway

Slope: 2 to 8 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Mixed alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.5 inches

### Additional Components

Monad and similar soils: 10 percent
Libeg and similar soils: 5 percent

## 39E—Winspect gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,500 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope: 15 to 35 percent
*Elevation:* 5,400 to 6,500 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 5 percent
Shawmut and similar soils: 5 percent
Winspect, cobbly and similar soils: 5 percent

## 41C—Perma gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 4 to 8 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Braziel and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Winspect and similar soils: 5 percent

## 41D—Perma gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 8 to 15 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Braziel and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Winspect and similar soils: 5 percent

## 41F—Perma gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Alluvial fan
*Slope:* 35 to 60 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Alluvium and/or colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Whitlash and similar soils: 5 percent

## 45B—Redchief cobbly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 2 to 4 percent
*Elevation:* 5,900 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 45C—Redchief cobbly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 4 to 8 percent
*Elevation:* 5,900 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 45D—Redchief cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 8 to 15 percent
*Elevation:* 5,900 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 45E—Redchief cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 45F—Redchief cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 35 to 60 percent
*Elevation:* 5,900 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 46B—Roy gravelly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 46C—Roy gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 46D—Roy gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 46E—Roy gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 46F—Roy gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 47C—Bridger cobbly loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bridger and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,900 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Donald and similar soils: 5 percent
Eyerbow and similar soils: 5 percent
Redchief and similar soils: 5 percent

## 47D—Bridger cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bridger and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,900 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Donald and similar soils: 5 percent
Eyerbow and similar soils: 5 percent
Redchief and similar soils: 5 percent

## 47E—Bridger cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bridger and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Donald and similar soils: 5 percent
Eyerbow and similar soils: 5 percent
Redchief and similar soils: 5 percent

## 48C—Mollet loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mollet and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 2 to 8 percent
*Elevation:* 6,000 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Redchief and similar soils: 10 percent
Libeg and similar soils: 5 percent

## 48D—Mollet loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mollet and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 8 to 15 percent
*Elevation:* 6,000 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Redchief and similar soils: 10 percent
Libeg and similar soils: 5 percent

## 48E—Mollet loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mollet and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 15 to 35 percent
*Elevation:* 6,000 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Redchief and similar soils: 10 percent
Libeg and similar soils: 5 percent

## 49B—Danvers clay loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Danvers and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,600 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Martinsdale and similar soils: 8 percent
Roy and similar soils: 7 percent

## 49E—Danvers clay loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Danvers and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Martinsdale and similar soils: 8 percent
Roy and similar soils: 7 percent

## 50C—Monad loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Monad and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 2 to 8 percent
*Elevation:* 5,900 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

### Additional Components

Adel and similar soils: 5 percent
Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent

## 50D—Monad loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Monad and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 8 to 15 percent
*Elevation:* 5,900 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

### Additional Components

Adel and similar soils: 5 percent
Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent

## 51B—Shawmut gravelly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 51C—Shawmut gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut, cobbly and similar soils: 5 percent

## 51D—Shawmut gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 51E—Shawmut gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 51F—Shawmut gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 52B—Martinsdale loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 52C—Martinsdale loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 52D—Martinsdale loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,400 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Alluvial fan
*Slope:* 8 to 15 percent
*Elevation:* 4,400 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Martinsdale, greater slope and similar soils: 5 percent
Martinsdale, cobbly and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 52E—Martinsdale loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 54B—Libeg gravelly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 2 to 4 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Finn and similar soils: 5 percent
Mollet and similar soils: 5 percent

## 54C—Libeg gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,400 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Finn and similar soils: 5 percent
Mollet and similar soils: 5 percent

## 54D—Libeg gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 8 to 15 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 54E—Libeg gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,400 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 54F—Libeg gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 8,200 feet
*Mean annual precipitation:* 15 to 25 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,400 to 8,200 feet
*Effective annual precipitation:* 15 to 25 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Redchief and similar soils: 5 percent
Rock outcrop: 5 percent

## 55D—Maciver gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maciver and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Interfluve on hill
- Side slope on hill
- Mountainflank on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,400 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium or gravelly slope alluvium
*Flooding:* None
*Available water capacity:* Mainly 13.2 inches

### Additional Components

Libeg and similar soils: 8 percent
Tibson and similar soils: 7 percent

## 55E—Maciver gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maciver and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Interfluve on hill
- Side slope on hill
- Mountainflank on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium or gravelly slope alluvium
*Flooding:* None
*Available water capacity:* Mainly 13.2 inches

### Additional Components

Libeg and similar soils: 8 percent
Tibson and similar soils: 7 percent

## 59D—Tewfel-Hackney complex, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,500 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Tewfel and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 4 to 15 percent
*Elevation:* 5,500 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Shale
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Hackney and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Shoulder on hill
*Slope:* 4 to 15 percent

*Elevation:* 5,500 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (paralithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Shale
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Rock outcrop: 5 percent
Tewfel, greater slope and similar soils: 5 percent
Winspect and similar soils: 5 percent

## 59E—Tewfel-Hackney complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,500 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Tewfel and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Shale
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Hackney and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Shoulder on hill
*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (paralithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Shale
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Hackney, greater slope and similar soils: 5 percent
Rock outcrop: 5 percent
Winspect and similar soils: 5 percent

## 60B—Quigley loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,360 to 6,020 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Quigley and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Outwash plain
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,360 to 6,020 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.9 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 60C—Quigley loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Quigley and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Perma and similar soils: 4 percent
Quigley, greater slope and similar soils: 4 percent
Quigley, calcareous and similar soils: 4 percent
Quigley, cobbly and similar soils: 3 percent

## 60D—Quigley loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Quigley and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Alluvial fan
*Slope:* 8 to 15 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Perma and similar soils: 4 percent
Quigley, greater slope and similar soils: 4 percent
Quigley, calcareous and similar soils: 4 percent
Quigley, cobbly and similar soils: 3 percent

## 66E—Bata gravelly ashy loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 7,400 feet
*Mean annual precipitation:* 25 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bata and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 6,300 to 7,400 feet
*Effective annual precipitation:* 25 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Belt colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Evaro and similar soils: 5 percent
Holloway and similar soils: 5 percent
Worock and similar soils: 5 percent

## 68D—Phillcher gravelly ashy silt loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 8,720 feet
*Mean annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days

### Component Description

**Phillcher and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountaintop on mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 7,000 to 8,720 feet
*Effective annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

### Additional Components

Rock outcrop: 10 percent
Holloway and similar soils: 5 percent

## 68E—Phillcher gravelly ashy silt loam, 15 to 45 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 8,720 feet
*Mean annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days

### Component Description

**Phillcher and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountaintop on mountain slope
*Slope:* 15 to 45 percent
*Elevation:* 7,000 to 8,720 feet
*Effective annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

### Additional Components

Rock outcrop: 10 percent
Holloway and similar soils: 5 percent

## 75E—Hanson gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Hanson and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Tibson and similar soils: 6 percent
Levengood and similar soils: 5 percent
Rock outcrop: 4 percent

## 75F—Hanson gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Hanson and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Tibson and similar soils: 6 percent
Levengood and similar soils: 5 percent
Rock outcrop: 4 percent

## 76B—Tibson gravelly loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 2 to 4 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 76C—Tibson gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 4 to 8 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 76D—Tibson gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 8 to 15 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 76E—Tibson gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified

*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 76F—Tibson gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 78D—Rumsey gravelly ashy silt loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Rumsey and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Mountainbase on mountain
- Mountainflank on mountain

*Slope:* 8 to 15 percent
*Elevation:* 6,400 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Bata and similar soils: 5 percent
Elve and similar soils: 5 percent
Evaro and similar soils: 5 percent

## 78E—Rumsey gravelly ashy silt loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Rumsey and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainbase on mountain
- Mountainflank on mountain

*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Bata and similar soils: 5 percent
Elve and similar soils: 5 percent
Evaro and similar soils: 5 percent

## 81E—Holloway gravelly ashy silt loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

### Additional Components

Evaro and similar soils: 8 percent
Rumsey and similar soils: 7 percent

## 81F—Holloway gravelly ashy silt loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

### Additional Components

Evaro and similar soils: 8 percent
Rumsey and similar soils: 7 percent

## 82D—Elve gravelly loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 5,600 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Evaro and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 82E—Elve gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium

*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Evaro and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 82F—Elve gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Evaro and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 82G—Elve gravelly loam, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 5,800 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Evaro and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 84C—Helmville cobbly loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 6,500 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Helmville and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 2 to 8 percent
*Elevation:* 6,500 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Whitore and similar soils: 5 percent

## 84D—Helmville cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Helmville and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Whitore and similar soils: 5 percent

## 84E—Helmville cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Helmville and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Whitore and similar soils: 5 percent

## 84F—Helmville cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Helmville and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Whitore and similar soils: 5 percent

## 85D—Loberg gravelly loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Loberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 4 to 15 percent
*Elevation:* 5,800 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Danaher and similar soils: 6 percent
Worock and similar soils: 5 percent
Foolhen and similar soils: 4 percent

## 85E—Loberg gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Loberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 5,800 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Danaher and similar soils: 5 percent
Worock and similar soils: 4 percent
Foolhen and similar soils: 3 percent
Rock outcrop: 3 percent

## 85F—Loberg gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Loberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,800 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Danaher and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 86D—Winkler gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winkler and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,400 to 6,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Rock outcrop: 8 percent
Bignell and similar soils: 7 percent

## 86E—Winkler gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winkler and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Rock outcrop: 8 percent
Bignell and similar soils: 7 percent

## 86F—Winkler gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winkler and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,400 to 6,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Yreka and similar soils: 10 percent
Rock outcrop: 5 percent

## 87D—Danaher loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Danaher and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,000 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Foolhen and similar soils: 5 percent
Loberg and similar soils: 5 percent
Worock and similar soils: 5 percent

## 87E—Danaher loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Danaher and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,000 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

### Additional Components

Foolhen and similar soils: 5 percent
Loberg and similar soils: 5 percent
Worock and similar soils: 5 percent

## 88F—Whitecow gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 7,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Whitecow and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 7,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Trapps and similar soils: 8 percent
Rock outcrop: 7 percent

## 91D—Mohaggin stony ashy very fine sandy loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,000 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 7,800 to 9,000 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

### Additional Components

Mohaggin, greater slope and similar soils: 5 percent
Rubble land: 5 percent
Comad and similar soils: 3 percent
Mooseflat and similar soils: 2 percent

## 91E—Mohaggin stony ashy very fine sandy loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,000 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 7,800 to 9,000 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

### Additional Components

Mohaggin, greater slope and similar soils: 5 percent
Rubble land: 5 percent
Comad and similar soils: 3 percent
Mooseflat and similar soils: 2 percent

## 91F—Mohaggin stony ashy very fine sandy loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,600 to 9,000 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,600 to 9,000 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

### Additional Components

Mohaggin, bouldery and similar soils: 5 percent
Rubble land: 5 percent
Comad and similar soils: 3 percent
Mooseflat and similar soils: 2 percent

## 92C—Whitore gravelly loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 92D—Whitore gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 92E—Whitore gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,400 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 92F—Whitore gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,400 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 95D—Yreka gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,600 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Yreka and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,600 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium

*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Bignell and similar soils: 5 percent
Winkler and similar soils: 5 percent
Yreka, greater slope and similar soils: 5 percent

## 95E—Yreka gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 6,500 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Yreka and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain
*Slope:* 15 to 35 percent
*Elevation:* 4,000 to 6,500 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Winkler and similar soils: 7 percent
Rock outcrop: 5 percent
Rubble land: 3 percent

## 95F—Yreka gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,600 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Yreka and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,600 feet
*Effective annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Bignell and similar soils: 5 percent
Winkler and similar soils: 5 percent
Yreka, lesser slope and similar soils: 5 percent

## 96D—Worock gravelly loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,300 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Loberg and similar soils: 4 percent
Danaher and similar soils: 3 percent
Evaro and similar soils: 3 percent

## 96E—Worock gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Loberg and similar soils: 4 percent
Danaher and similar soils: 3 percent
Evaro and similar soils: 3 percent

## 96F—Worock gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Evaro and similar soils: 4 percent
Danaher and similar soils: 3 percent
Loberg and similar soils: 3 percent

## 97C—Evaro gravelly ashy loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 8 percent
*Elevation:* 6,000 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve and similar soils: 5 percent
Holloway and similar soils: 5 percent
Worock and similar soils: 5 percent

## 97D—Evaro gravelly ashy loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 6,400 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve and similar soils: 5 percent
Holloway and similar soils: 5 percent
Worock and similar soils: 5 percent

## 97E—Evaro gravelly ashy loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Holloway and similar soils: 4 percent
Rock outcrop: 4 percent
Worock and similar soils: 4 percent
Elve and similar soils: 3 percent

## 97F—Evaro gravelly ashy loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,650 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,650 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted

*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Rock outcrop: 5 percent
Elve and similar soils: 3 percent
Holloway and similar soils: 3 percent
Worock and similar soils: 3 percent
Rubble land: 1 percent

## 98F—Trapps gravelly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Trapps and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium or gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches

### Additional Components

Rock outcrop: 5 percent
Silverchief and similar soils: 5 percent
Whitecow and similar soils: 5 percent

## 99E—Bignell gravelly clay loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,560 to 6,000 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Bignell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,560 to 6,000 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium and/or till
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Rock outcrop: 5 percent
Yreka, greater slope and similar soils: 5 percent
Yreka and similar soils: 5 percent

## 100—Rubble land-Rock outcrop complex

### Component Description

**Rubble land**
*Composition:* 65 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

## 102—Pits, gravel

### Component Description

**Pits, gravel**
*Composition:* 100 percent
*Definition:* This component consists of open excavations from which soil and commonly underlying material have been removed, exposing either rock or other material.

## 103—Dumps, mine

### Component Description

**Dumps, mine**
*Composition:* 100 percent
*Definition:* Dumps, mine consist of areas of waste rock from mines, quarries, and smelters.

## 104A—Fluvaquentic Endoaquolls-Slickens complex, 0 to 2 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Fluvaquentic Endoaquolls and similar soils**
*Composition:* 75 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,600 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 6.1 inches

**Slickens**
*Composition:* 10 percent
*Definition:* Slickens are accumulations of fine-textured material, such as that separated in placer mine and ore mill operations. Slickens from ore mills consist largely of freshly ground rock that commonly has undergone chemical treatment during the milling process.

### Additional Components

Aquic Cumulic Haplustolls and similar soils: 5 percent
Mccabe and similar soils: 3 percent
Saypo and similar soils: 3 percent
Canarway and similar soils: 2 percent
Riverwash: 1 percent
Water: 1 percent

## 105A—Slickens-Fluvaquentic Endoaquolls complex, 0 to 2 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Slickens**
*Composition:* 50 percent
*Definition:* Slickens are accumulations of fine-textured material, such as that separated in placer mine and ore mill operations. Slickens from ore mills consist largely of freshly ground rock that commonly has undergone chemical treatment during the milling process.

**Fluvaquentic Endoaquolls and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,600 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 6.1 inches

### Additional Components

Aquic Cumulic Haplustolls and similar soils: 5 percent
Mccabe and similar soils: 3 percent
Saypo and similar soils: 3 percent
Canarway and similar soils: 2 percent
Riverwash: 1 percent
Water: 1 percent

## 106—Slickens

### Component Description

**Slickens**
*Composition:* 85 percent
*Definition:* Slickens are accumulations of fine-textured material, such as that separated in placer mine and ore mill operations. Slickens from ore mills consist largely of freshly ground rock that commonly has undergone chemical treatment during the milling process.

### Additional Components

Dumps, mine: 15 percent

# 107A—Aquic Cumulic Haplustolls-Aridic Ustifluvents-Slickens complex, 0 to 2 percent slopes, severely impacted

## Map Unit Setting

*Elevation:* 4,700 to 5,100 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

## Component Description

**Aquic Cumulic Haplustolls and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,700 to 5,100 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Mixed alluvium
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 8.5 inches

**Aridic Ustifluvents and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,700 to 5,100 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Stratified loamy sand to loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Mixed alluvium
*Native plant cover type:* Forest land
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 7.1 inches

**Slickens**
*Composition:* 20 percent
*Definition:* Slickens are accumulations of fine-textured material, such as that separated in placer mine and ore mill operations. Slickens from ore mills consist largely of freshly ground rock that commonly has undergone chemical treatment during the milling process.

## Additional Components

Canarway and similar soils: 5 percent
Mccabe and similar soils: 5 percent
Gregson and similar soils: 3 percent
Riverwash: 2 percent

# 108A—Slickens-Aridic Ustifluvents-Aquic Cumulic Haplustolls complex, 0 to 2 percent slopes, severely impacted

## Map Unit Setting

*Elevation:* 4,700 to 5,100 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 70 to 105 days

## Component Description

**Slickens**
*Composition:* 50 percent
*Definition:* Slickens are accumulations of fine-textured material, such as that separated in placer mine and ore mill operations. Slickens from ore mills consist largely of freshly ground rock that commonly has undergone chemical treatment during the milling process.

**Aridic Ustifluvents and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,700 to 5,100 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Mixed alluvium
*Native plant cover type:* Forest land
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 5.9 inches

**Aquic Cumulic Haplustolls and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,700 to 5,100 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 9.6 inches

## Additional Components

Aeric Fluvaquents and similar soils: 5 percent
Aquic Haplustolls and similar soils: 3 percent
Riverwash: 2 percent

## 110A—Carten-Wetsand complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 4,200 to 6,000 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Carten and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,200 to 6,000 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.4 inches

**Wetsand and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,200 to 6,000 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Salt affected:* Saline within 30 inches
*Available water capacity:* Mainly 3.8 inches

### Additional Components

Water: 6 percent
Riverwash: 5 percent
Carten, greater slope and similar soils: 4 percent

## 114A—Mooseflat loam, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mooseflat and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Dunkleber and similar soils: 5 percent
Foolhen and similar soils: 5 percent
Mooseflat and similar soils: 5 percent

## 116A—Eine-Nana complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,100 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eine and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Sandy and gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 3.6 inches

**Nana and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Zelda and similar soils: 10 percent
Water: 3 percent
Riverwash: 2 percent

## 117A—Zelda-Nana-Foolhen complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,100 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Zelda and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 6.4 inches

**Nana and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained

*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 5.0 inches

**Foolhen and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,800 to 6,100 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Eine and similar soils: 5 percent
Mooseflat and similar soils: 5 percent
Water: 5 percent

## 120C—Eyerbow-Donald cobbly loams, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eyerbow and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 9.3 inches

**Donald and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Bridger and similar soils: 5 percent
Quigg and similar soils: 5 percent

## 120D—Eyerbow-Donald cobbly loams, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eyerbow and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.3 inches

**Donald and similar soils**
*Composition:* 40 percent

*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Bridger and similar soils: 5 percent
Quigg and similar soils: 5 percent

## 120E—Eyerbow-Donald complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Eyerbow and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.3 inches

**Donald and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Bridger and similar soils: 5 percent
Quigg and similar soils: 5 percent

## 121B—Maurice-Danielvil complex, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 7,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maurice and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,700 to 7,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Danielvil and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,800 to 6,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Coarse-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.0 inches

### Additional Components

Adel and similar soils: 5 percent
Foolhen and similar soils: 5 percent
Monad and similar soils: 5 percent

## 127D—Julius clay loam, 8 to 15 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Julius and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Arlen and similar soils: 5 percent
Julius, greater slope and similar soils: 5 percent

## 129C—Wimper-Winspect complex, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,440 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wimper and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Mountainbase on mountain
- Mountainflank on mountain

*Slope:* 4 to 8 percent
*Elevation:* 5,440 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium or gravelly colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches

**Winspect and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 4 to 8 percent
*Elevation:* 5,440 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Staad and similar soils: 5 percent
Wimper, greater slope and similar soils: 5 percent
Winspect, greater slope and similar soils: 5 percent

## 129E—Wimper-Winspect complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,440 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wimper and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Mountainbase on mountain
- Mountainflank on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,440 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Calcareous gravelly alluvium or gravelly colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches

**Winspect and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,440 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Perma and similar soils: 8 percent
Rock outcrop: 7 percent

## 131C—Varney cobbly clay loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Con and similar soils: 8 percent
Sixbeacon and similar soils: 7 percent

## 131D—Varney cobbly clay loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Con and similar soils: 8 percent
Sixbeacon and similar soils: 7 percent

## 131E—Varney cobbly clay loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Anaconda and similar soils: 8 percent
Sixbeacon and similar soils: 7 percent

## 131F—Varney cobbly clay loam, 35 to 50 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 50 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Anaconda and similar soils: 8 percent
Sixbeacon and similar soils: 7 percent

## 132B—Beaverell cobbly loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

### Additional Components

Con and similar soils: 10 percent
Gregson and similar soils: 5 percent

## 132C—Beaverell cobbly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

### Additional Components

Con and similar soils: 10 percent
Gregson and similar soils: 5 percent

## 134C—Cetrack loam, 4 to 8 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 4,900 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Cetrack and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Alluvial fan
- Outwash plain
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,900 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium over sandy and gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Beaverell and similar soils: 5 percent
Reclaimed Areas and similar soils: 5 percent
Severely Disturbed Areas and similar soils: 5 percent

## 136E—Varney-Con complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,700 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,700 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Sixbeacon and similar soils: 10 percent

## 136F—Varney-Con complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 50 percent
*Elevation:* 4,700 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

**Con and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 4,700 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Aridic Ustorthents, fine and similar soils: 8 percent
Sixbeacon and similar soils: 7 percent

## 137B—Sixbeacon cobbly loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Con and similar soils: 10 percent
Anaconda and similar soils: 5 percent

## 137C—Sixbeacon cobbly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 3,800 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Sixbeacon, gravelly and similar soils: 8 percent
Cetrack and similar soils: 7 percent

## 137D—Sixbeacon cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Alluvial fan
*Slope:* 8 to 15 percent
*Elevation:* 3,800 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Sixbeacon, gravelly and similar soils: 8 percent
Cetrack and similar soils: 7 percent

## 145C—Redchief-Mollet complex, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 50 percent

*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 4 to 8 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Mollet and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 4 to 8 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Libeg and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 145D—Redchief-Mollet complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,700 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 8 to 15 percent

*Elevation:* 5,600 to 6,700 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Mollet and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 8 to 15 percent
*Elevation:* 5,600 to 6,700 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Libeg and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 145E—Redchief-Mollet complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,700 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,600 to 6,700 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Mollet and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,600 to 6,700 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Libeg and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 148C—Mollet cobbly loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mollet and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 2 to 8 percent
*Elevation:* 6,200 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches

### Additional Components

Monad and similar soils: 8 percent
Adel and similar soils: 7 percent

## 148D—Mollet cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mollet and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 8 to 15 percent
*Elevation:* 6,200 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches

### Additional Components

Monad and similar soils: 8 percent
Adel and similar soils: 7 percent

## 151D—Shawmut cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Roy and similar soils: 5 percent

## 151E—Shawmut cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Roy and similar soils: 5 percent

## 151F—Shawmut cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Roy and similar soils: 5 percent

## 152C—Clasoil sandy loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 3,500 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium and/or colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

### Additional Components

Crackerville and similar soils: 8 percent
Clasoil, greater slope and similar soils: 7 percent

## 152D—Clasoil sandy loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

### Additional Components

Crackerville and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Rock outcrop: 5 percent

## 154E—Libeg cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,750 to 7,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,750 to 7,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Finn and similar soils: 5 percent
Rock outcrop: 5 percent

## 154F—Libeg cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,750 to 7,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,750 to 7,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Finn and similar soils: 5 percent
Rock outcrop: 5 percent

## 176D—Tibson-Levengood gravelly loams, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 8 to 15 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Levengood and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountainflank on mountain
Sl*ope:* 8 to 15 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Libeg and similar soils: 5 percent
Maciver and similar soils: 5 percent
Rock outcrop: 5 percent

## 176F—Tibson-Levengood gravelly loams, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 55 percent

*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Levengood and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountainflank on mountain
Sl*ope:* 35 to 60 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Libeg and similar soils: 5 percent
Maciver and similar soils: 5 percent
Rock outcrop: 5 percent

## 179E—Ambrant-Rochester complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 6,800 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Ambrant and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,000 to 6,800 feet
*Effective annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

**Rochester and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,000 to 6,800 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.4 inches

### Additional Components

Bignell and similar soils: 8 percent
Rock outcrop: 7 percent

## 179F—Ambrant-Rochester complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 6,800 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Ambrant and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,800 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

**Rochester and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,800 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.4 inches

### Additional Components

Bignell and similar soils: 8 percent
Rock outcrop: 7 percent

## 182F—Elve very cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,700 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Libeg and similar soils: 8 percent
Rock outcrop: 7 percent

# 185E—Relyea-Helmville complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,700 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Relyea and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 5,700 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone and/or colluvium derived from argillite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Helmville and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,700 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

## Additional Components

Danaher and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 192E—Whitore gravelly clay loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 7,200 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 7,200 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 8 percent
Helmville and similar soils: 7 percent

## 195E—Yreka gravelly loam, cool, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,000 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Yreka and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,000 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Bignell and similar soils: 5 percent
Silverchief and similar soils: 5 percent
Winkler and similar soils: 5 percent

## 198E—Trapps-Yreka stony loams, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 6,500 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Trapps and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 4,000 to 6,500 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Yreka and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 4,000 to 6,500 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Bignell and similar soils: 4 percent
Trapps, bouldery and similar soils: 4 percent
Whitecow and similar soils: 4 percent
Trapps, greater slope and similar soils: 3 percent

# 214A—Foolhen-Mooseflat-Water complex, 0 to 2 percent slopes

## Map Unit Setting

*Elevation:* 5,740 to 7,000 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Mooseflat and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,740 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

**Foolhen and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,740 to 7,000 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

**Water**
*Composition:* 25 percent
*Definition:* Water includes streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.

## Additional Components

Dunkleber and similar soils: 8 percent
Finn and similar soils: 7 percent

# 227E—Julius-Tolbert complex, 15 to 35 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,200 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Julius and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

## Additional Components

Danvers and similar soils: 10 percent
Wilspring and similar soils: 3 percent
Rock outcrop: 2 percent

# 230E—Quigg-Libeg complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,940 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Quigg and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,940 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,940 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

## Additional Components

Copenhaver and similar soils: 10 percent
Mollet and similar soils: 5 percent

## 232B—Beaverell cobbly loam, 1 to 4 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 1 to 4 percent
*Elevation:* 5,200 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 3.1 inches

### Additional Components

Sixbeacon and similar soils: 6 percent
Cetrack and similar soils: 4 percent

## 232E—Beaverell cobbly loam, 15 to 35 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Extremely cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium

*Flooding:* None
*Available water capacity:* Mainly 2.5 inches

### Additional Components

Sixbeacon and similar soils: 10 percent

## 235B—Anaconda sandy loam, 0 to 4 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,500 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,500 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 236B—Varney sandy clay loam, 2 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 4,000 to 5,200 feet

*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Anaconda and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 236C—Varney sandy clay loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Con and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 236D—Varney sandy clay loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,600 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,600 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

### Additional Components

Anaconda and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 236E—Varney sandy clay loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 4,600 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,600 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

### Additional Components

Anaconda and similar soils: 4 percent
Con and similar soils: 4 percent

Sixbeacon and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 237B—Sixbeacon gravelly loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Varney and similar soils: 5 percent

## 237C—Sixbeacon gravelly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Varney and similar soils: 5 percent

## 237D—Sixbeacon gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon, cobbly and similar soils: 5 percent

## 242D—Braziel gravelly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Braziel and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 8 to 15 percent
*Elevation:* 5,600 to 6,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanics
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Perma and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Staad and similar soils: 5 percent

## 242E—Braziel gravelly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Braziel and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,600 to 6,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanics
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Perma and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Staad and similar soils: 5 percent

# 245D—Redchief-Mollet bouldery loams, 4 to 15 percent slopes

## Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Redchief and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 4 to 15 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

**Mollet and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Fan
- Mountainbase on mountain
- Terrace

Slope*:* 4 to 15 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches

## Additional Components

Libeg and similar soils: 8 percent
Lolon and similar soils: 7 percent

## 246D—Roy gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainflank on mountain
- Mountainbase on mountain
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Caramon and similar soils: 5 percent
Julius and similar soils: 5 percent

## 246E—Roy gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,900 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Caramon and similar soils: 8 percent
Roy, greater slope and similar soils: 5 percent
Julius and similar soils: 2 percent

## 251D—Shawmut stony loam, 0 to 15 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Alluvial fan
*Slope:* 0 to 15 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Roy and similar soils: 8 percent
Winspect and similar soils: 7 percent

## 251E—Shawmut stony loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,300 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Roy and similar soils: 8 percent
Winspect and similar soils: 7 percent

## 254E—Libeg stony loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,800 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 6,000 to 6,800 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Tolbert and similar soils: 5 percent

## 254F—Libeg stony loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,800 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 6,000 to 6,800 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Tolbert and similar soils: 5 percent

## 275F—Hanson stony loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Hanson and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,000 to 7,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Tibson and similar soils: 8 percent
Rock outcrop: 7 percent

## 276D—Tibson stony loam, 2 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 2 to 15 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Libeg and similar soils: 10 percent
Maurice and similar soils: 5 percent

## 280E—Comad-Elkner-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,800 to 8,400 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,800 to 8,400 feet

*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Elkner and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,800 to 8,400 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.6 inches

**Rock outcrop**
*Composition:* 25 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 10 percent

## 280F—Comad-Elkner-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,800 to 8,400 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,800 to 8,400 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite

*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Elkner and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,800 to 8,400 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.6 inches

**Rock outcrop**
*Composition:* 25 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 10 percent

## 282D—Elve gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Elve, greater slope and similar soils: 5 percent
Libeg and similar soils: 5 percent
Karloff and similar soils: 3 percent
Adel and similar soils: 2 percent

## 282E—Elve gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Elve, greater slope and similar soils: 5 percent
Libeg and similar soils: 5 percent
Karloff and similar soils: 3 percent
Adel and similar soils: 2 percent

## 282F—Elve gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,200 feet

*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Elve, lesser slope and similar soils: 5 percent
Libeg and similar soils: 5 percent
Karloff and similar soils: 3 percent
Rock outcrop: 2 percent

## 282G—Elve gravelly loam, 60 to 85 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 85 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Elve, lesser slope and similar soils: 5 percent
Libeg and similar soils: 5 percent
Karloff and similar soils: 3 percent
Rock outcrop: 2 percent

# 296E—Worock-Elve-Whitore stony loams, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,000 to 7,500 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Worock and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 5,600 to 7,500 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Elve and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 5,000 to 7,500 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Whitore and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 5,200 to 7,200 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Evaro and similar soils: 5 percent
Loberg and similar soils: 5 percent
Rock outcrop: 5 percent

## 300B—Arents, 1 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Arents and similar soils**
*Composition:* 90 percent
*Geomorphic description:* None assigned
*Slope:* 1 to 4 percent
*Elevation:* 5,080 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Sixbeacon and similar soils: 6 percent
Beaverell and similar soils: 2 percent
Cetrack and similar soils: 2 percent

## 300F—Arents, 30 to 45 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Arents and similar soils**
*Composition:* 90 percent
*Geomorphic description:* None assigned
*Slope:* 30 to 45 percent
*Elevation:* 5,080 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Beaverell and similar soils: 6 percent
Sixbeacon and similar soils: 2 percent
Slickens: 2 percent

## 314A—Kilgore-Foolhen-Mooseflat complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Kilgore and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 4.5 inches

**Foolhen and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

**Mooseflat and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet

*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Dunkleber and similar soils: 8 percent
Water: 7 percent

## 332B—Beaverell loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 3,600 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 3,600 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Carten and similar soils: 7 percent
Beaverell, cobbly and similar soils: 4 percent
Beaverell, greater slope and similar soils: 4 percent

# 335B—Tetonview-Blossberg-Poronto complex, 0 to 4 percent slopes, rarely flooded

## Map Unit Setting

*Elevation:* 4,700 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

## Component Description

**Tetonview and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.9 inches

**Blossberg and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

**Poronto and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland

*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Gregson and similar soils: 5 percent
Mannixlee and similar soils: 5 percent
Turrah and similar soils: 5 percent

## 336B—Varney-Anaconda loams, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,000 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 110 days

### Component Description

**Varney and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,000 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Salt affected:* Saline within 30 inches
*Available water capacity:* Mainly 7.6 inches

**Anaconda and similar soils**
*Composition:* 30 percent
*Geomorphic description:* None assigned
*Slope:* 0 to 4 percent
*Elevation:* 4,000 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 95 to 110 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Salt affected:* Saline within 30 inches
*Available water capacity:* Mainly 7.4 inches

### Additional Components

Varney, cobbly and similar soils: 10 percent

## 337B—Sixbeacon fine sandy loam, 1 to 4 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 1 to 4 percent
*Elevation:* 5,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Cetrack and similar soils: 8 percent
Beaverell and similar soils: 5 percent
Slickens: 2 percent

## 337C—Sixbeacon fine sandy loam, 4 to 8 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Cetrack and similar soils: 8 percent
Beaverell and similar soils: 5 percent
Slickens: 2 percent

## 338C—Perma cobbly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 4 to 8 percent
*Elevation:* 5,100 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Anaconda and similar soils: 5 percent
Wimper and similar soils: 5 percent
Beaverell and similar soils: 3 percent
Staad and similar soils: 2 percent

## 339E—Winspect cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,000 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 7 percent
Windham and similar soils: 5 percent
Wimper and similar soils: 3 percent

## 339F—Winspect cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,000 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 7 percent
Windham and similar soils: 5 percent
Wimper and similar soils: 3 percent

# 345F—Redchief-Tibson complex, 35 to 60 percent slopes

## Map Unit Setting

*Elevation:* 5,800 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Redchief and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Tibson and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

## Additional Components

Libeg and similar soils: 5 percent
Mollet and similar soils: 5 percent
Monad and similar soils: 5 percent

# 351E—Roy-Shawmut-Danvers complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 3,800 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Alluvial fan
*Slope:* 15 to 35 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Shawmut and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 15 to 35 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Danvers and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Alluvial fan
*Slope:* 15 to 35 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Roy, greater slope and similar soils: 5 percent
Roy, extremely cobbly and similar soils: 5 percent
Shawmut, calcareous and similar soils: 5 percent

## 351F—Roy-Shawmut-Danvers complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 35 to 60 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Shawmut and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 35 to 60 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Danvers and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 35 to 60 percent
*Elevation:* 3,800 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly clay loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Roy, extremely cobbly and similar soils: 5 percent
Roy, greater slope and similar soils: 5 percent
Shawmut, calcareous and similar soils: 5 percent

## 352C—Martinsdale cobbly loam, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.9 inches

### Additional Components

Danvers and similar soils: 5 percent
Roy and similar soils: 5 percent
Shawmut and similar soils: 3 percent
Winspect and similar soils: 2 percent

## 352D—Martinsdale cobbly loam, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.9 inches

### Additional Components

Danvers and similar soils: 5 percent
Roy and similar soils: 5 percent
Shawmut and similar soils: 3 percent
Winspect and similar soils: 2 percent

## 352E—Martinsdale cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.9 inches

### Additional Components

Danvers and similar soils: 4 percent
Roy and similar soils: 4 percent

Shawmut and similar soils: 4 percent
Winspect and similar soils: 3 percent

## 352F—Martinsdale cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.9 inches

### Additional Components

Danvers and similar soils: 4 percent
Roy and similar soils: 4 percent
Shawmut and similar soils: 4 percent
Winspect and similar soils: 3 percent

## 354D—Libeg-Redchief complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,400 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 8 to 15 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 15 to 23 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

**Redchief and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Backslope on hill
- Footslope on hill
- Mountainbase on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 5 percent
Mollet and similar soils: 5 percent
Monad and similar soils: 5 percent

## 354E—Libeg-Redchief complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,400 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

**Redchief and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,800 to 7,400 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 5 percent
Mollet and similar soils: 5 percent
Monad and similar soils: 5 percent

## 376E—Tibson very stony loam, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,300 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 8 to 25 percent
*Elevation:* 5,800 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Levengood and similar soils: 5 percent
Libeg and similar soils: 5 percent
Maciver and similar soils: 5 percent

## 379E—Ambrant-Rochester-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 7,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Ambrant and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 7,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Bouldery coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

**Rochester and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 7,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very bouldery coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.4 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Bignell and similar soils: 10 percent

## 379F—Ambrant-Rochester-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 7,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Ambrant and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,400 to 7,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Bouldery coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

**Rochester and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,400 to 7,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very bouldery coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.4 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Bignell and similar soils: 10 percent

## 387E—Danaher-Loberg complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,990 to 6,700 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Danaher and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,990 to 6,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Loberg and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,990 to 6,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 391F—Mohaggin bouldery ashy very fine sandy loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,100 to 7,400 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,100 to 7,400 feet

*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

### Additional Components

Worock and similar soils: 10 percent
Mooseflat and similar soils: 3 percent
Rubble land: 2 percent

## 392E—Whitore cobbly loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 7,800 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 392F—Whitore cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 7,800 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 400D—Aridic Ustorthents, clayey substratum, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,160 to 5,280 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aridic Ustorthents and similar soils**
*Composition:* 90 percent
*Geomorphic description:* None assigned
*Slope:* 4 to 15 percent
*Elevation:* 5,160 to 5,280 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Roy and similar soils: 4 percent
Beaverell and similar soils: 3 percent
Slag and similar soils: 3 percent

# 414A—Kilgore-Mooseflat-Water complex, 0 to 2 percent slopes

## Map Unit Setting

*Elevation:* 4,740 to 8,800 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Kilgore and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,740 to 8,800 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 4.5 inches

**Mooseflat and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,740 to 8,800 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

**Water**
*Composition:* 10 percent
*Definition:* Water includes streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.

## Additional Components

Dunkleber and similar soils: 5 percent
Foolhen and similar soils: 5 percent

# 430C—Quigg-Mollet complex, 2 to 8 percent slopes

## Map Unit Setting

*Elevation:* 5,800 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Quigg and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Mollet and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Fan
- Terrace

*Slope:* 2 to 8 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

## Additional Components

Adel and similar soils: 5 percent
Monad and similar soils: 5 percent
Redchief and similar soils: 5 percent

# 430D—Quigg-Mollet complex, 8 to 15 percent slopes

## Map Unit Setting

*Elevation:* 5,800 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Quigg and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Mollet and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Fan
- Terrace

Sl*ope:* 8 to 15 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

## Additional Components

Adel and similar soils: 5 percent
Monad and similar soils: 5 percent
Redchief and similar soils: 5 percent

# 430E—Quigg-Mollet complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,800 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Quigg and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Mollet and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Fan
- Terrace

Sl*ope:* 15 to 35 percent
*Elevation:* 5,800 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

## Additional Components

Adel and similar soils: 5 percent
Monad and similar soils: 5 percent
Redchief and similar soils: 5 percent

## 432B—Beaverell cobbly loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,960 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,960 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

### Additional Components

Cetrack and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 432C—Beaverell cobbly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,960 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,960 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

### Additional Components

Cetrack and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 437E—Adel-Mooseflat complex, 8 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Adel and similar soils**
*Composition:* 70 percent
*Geomorphic description:*
- Alluvial fan
- Drainageway

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Mixed alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 9.3 inches

**Mooseflat and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountainbase on mountain
Sl*ope:* 8 to 15 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Mooseflat, lesser slope and similar soils: 10 percent

## 438B—Perma cobbly loam, 2 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,820 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 2 to 4 percent
*Elevation:* 4,820 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Gregson and similar soils: 5 percent
Perma, greater slope and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 442E—Braziel-Tolbert complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Braziel and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Tolbert and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.7 inches

### Additional Components

Braziel, greater slope and similar soils: 3 percent
Crackerville and similar soils: 3 percent
Perma and similar soils: 3 percent
Rock outcrop: 3 percent
Roy and similar soils: 3 percent

## 442F—Braziel-Tolbert complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Braziel and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain
Sl*ope:* 35 to 60 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Tolbert and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain
Sl*ope:* 35 to 60 percent
*Elevation:* 3,800 to 5,000 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.7 inches

### Additional Components

Crackerville and similar soils: 3 percent
Perma and similar soils: 3 percent
Rock outcrop: 3 percent
Roy and similar soils: 3 percent
Tolbert, greater slope and similar soils: 3 percent

## 451E—Shawmut very bouldery loam, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very bouldery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Poronto and similar soils: 4 percent
Rochester and similar soils: 4 percent
Shawmut, greater slope and similar soils: 4 percent
Winspect and similar soils: 3 percent

# 454D—Libeg-Macabre-Redchief complex, 8 to 15 percent slopes

## Map Unit Setting

*Elevation:* 5,600 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

## Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 8 to 15 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Macabre and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 8 to 15 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

**Redchief and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 8 to 15 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 4 percent
Monad and similar soils: 4 percent
Rock outcrop: 4 percent
Mollet and similar soils: 3 percent

## 454E—Libeg-Macabre-Redchief complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Macabre and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days

*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

**Redchief and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 4 percent
Monad and similar soils: 4 percent
Rock outcrop: 4 percent
Mollet and similar soils: 3 percent

## 454F—Libeg-Macabre-Redchief complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Macabre and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

**Redchief and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 4 percent
Monad and similar soils: 4 percent
Rock outcrop: 4 percent
Mollet and similar soils: 3 percent

## 482E—Elve gravelly loam, dry, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Loberg and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 482F—Elve gravelly loam, dry, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Loberg and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 492E—Whitore, dry-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Helmville and similar soils: 5 percent
Loberg and similar soils: 5 percent
Relyea and similar soils: 5 percent

## 492F—Whitore, dry-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Helmville and similar soils: 5 percent
Loberg and similar soils: 5 percent
Relyea and similar soils: 5 percent

## 492G—Whitore, dry-Rock outcrop complex, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Helmville and similar soils: 5 percent
Loberg and similar soils: 5 percent
Relyea and similar soils: 5 percent

## 497C—Waldbillig gravelly ashy loam, 2 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,800 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
Sl*ope:* 2 to 8 percent
*Elevation:* 5,900 to 7,800 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Worock and similar soils: 7 percent
Evaro and similar soils: 4 percent
Helmville and similar soils: 4 percent

## 497E—Waldbillig gravelly ashy loam, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,800 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 5,900 to 7,800 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Worock and similar soils: 7 percent
Evaro and similar soils: 4 percent
Helmville and similar soils: 4 percent

## 509B—Gregson fine sandy loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 5,100 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Gregson and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 4,800 to 5,100 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.9 inches

### Additional Components

Blossberg and similar soils: 5 percent
Carten and similar soils: 5 percent
Cetrack and similar soils: 5 percent

## 514A—Mooseflat-Foolhen complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mooseflat and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

**Foolhen and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Dunkleber and similar soils: 5 percent
Finn and similar soils: 5 percent
Kilgore and similar soils: 5 percent

## 533B—Pozega silty clay loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,600 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Pozega and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Coarse-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None

*Water table:* Present
*Salt affected:* Saline within 30 inches
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Saypo and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 535B—Saypo loam, cool, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,600 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Saypo and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 8.1 inches

### Additional Components

Mcmanus and similar soils: 5 percent
Quigley and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 537B—Truchot gravelly loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,800 to 4,900 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Truchot and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,800 to 4,900 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Kleinschmidt and similar soils: 5 percent
Poronto and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 544B—Gregson loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,600 to 5,520 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Gregson and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,520 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.9 inches

### Additional Components

Carten and similar soils: 5 percent
Saypo and similar soils: 5 percent
Wetsand and similar soils: 5 percent

## 545B—Saypo loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,520 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Saypo and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,520 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 8.1 inches

### Additional Components

Blossberg and similar soils: 5 percent
Con and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 547B—Kleinschmidt gravelly loam, cool, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Kleinschmidt and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Poronto and similar soils: 5 percent
Quigley, calcareous and similar soils: 5 percent
Saypo, saline and similar soils: 5 percent

## 549B—Marcott silty clay loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,060 to 5,200 feet
*Mean annual precipitation:* 12 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Marcott and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 5,060 to 5,200 feet
*Effective annual precipitation:* 12 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Clayey calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Salt affected:* Saline within 30 inches
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 9.0 inches

### Additional Components

Gregson and similar soils: 5 percent
Saypo and similar soils: 5 percent
Turrah and similar soils: 5 percent

## 551F—Shawmut extremely bouldery loam, 8 to 50 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 50 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Extremely bouldery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Quigley and similar soils: 5 percent
Staad and similar soils: 5 percent
Poronto and similar soils: 3 percent
Water: 2 percent

## 552C—Clasoil-Crackerville complex, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountainside
*Slope:* 4 to 8 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 4 to 8 percent

*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Crackerville, stony and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Rock outcrop: 5 percent

## 552D—Clasoil-Crackerville complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 3,500 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain
Sl*ope:* 8 to 15 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain
Sl*ope:* 8 to 15 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained

*Parent material:* Colluvium derived from granite and/or residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.7 inches

### Additional Components

Perma, stony and similar soils: 5 percent
Rock outcrop: 5 percent
Tolbert and similar soils: 5 percent

## 552E—Clasoil-Crackerville complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 3,500 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite and/or residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.7 inches

### Additional Components

Perma, stony and similar soils: 5 percent
Rock outcrop: 5 percent
Tolbert and similar soils: 5 percent

## 552F—Clasoil-Crackerville complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountainside
*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

**Crackerville and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Rock outcrop and similar soils: 10 percent
Crackerville, stony and similar soils: 5 percent
Martinsdale and similar soils: 5 percent

# 554E—Redchief-Macabre-Libeg complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,900 to 6,300 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

## Component Description

**Redchief and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Macabre and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.7 inches

**Libeg and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,900 to 6,300 feet

*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Mollet and similar soils: 8 percent
Monad and similar soils: 7 percent

## 554F—Redchief-Macabre-Libeg complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,300 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

### Component Description

**Redchief and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Macabre and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 35 to 60 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy loam

*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.7 inches

**Libeg and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,900 to 6,300 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Mollet and similar soils: 8 percent
Monad and similar soils: 7 percent

## 557B—Kleinschmidt gravelly loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,800 to 5,520 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Kleinschmidt and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Stream terrace
- Terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,800 to 5,520 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None

*Water table:* Present
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Gregson and similar soils: 10 percent
Mannixlee and similar soils: 5 percent

## 562B—Carten loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Carten and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Outwash plain
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy alluvium over sandy and gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Gregson and similar soils: 5 percent
Truchot and similar soils: 5 percent
Wetsand and similar soils: 5 percent

## 576B—Finn gravelly loam, dry, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Finn and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 6,300 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 5.9 inches

### Additional Components

Adel and similar soils: 5 percent
Monad and similar soils: 5 percent
Mooseflat and similar soils: 5 percent

## 580D—Comad-Elkner complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Elkner and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Rock outcrop: 5 percent
Sandy clay loam subsoils and similar soils: 5 percent

## 580E—Comad-Elkner complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Elkner and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Rock outcrop: 5 percent
Rubble land: 5 percent

## 580F—Comad-Elkner complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Elkner and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Comad, greater slope and similar soils: 5 percent
Rock outcrop: 5 percent

## 582D—Elve-Rock outcrop complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 8,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent

*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,600 to 8,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Dunkleber and similar soils: 5 percent
Mohaggin and similar soils: 5 percent
Phillcher and similar soils: 5 percent

## 592E—Whitore gravelly loam, cold, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,400 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,300 to 8,400 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Helmville and similar soils: 5 percent

## 592F—Whitore gravelly loam, cold, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,400 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,300 to 8,400 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Helmville and similar soils: 5 percent

## 592G—Whitore gravelly loam, cold, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 6,300 to 8,400 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 6,300 to 8,400 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Rock outcrop: 10 percent
Helmville and similar soils: 5 percent

## 596E—Worock-Loberg complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Loberg and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 5,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Danaher and similar soils: 6 percent
Elve and similar soils: 3 percent
Foolhen and similar soils: 3 percent
Rock outcrop: 3 percent

## 597D—Evaro gravelly ashy loam, cold, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 7,700 to 8,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 7,700 to 8,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve and similar soils: 5 percent
Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent

## 597E—Evaro gravelly ashy loam, cold, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 7,700 to 8,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 7,700 to 8,500 feet
*Effective annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve and similar soils: 5 percent
Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent

## 597F—Evaro gravelly ashy loam, cold, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,700 to 8,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,700 to 8,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve and similar soils: 5 percent
Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent

## 599D—Silverchief-Trapps complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,000 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Silverchief and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Mountainbase on mountain
- Mountainflank on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous slope alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 7.4 inches

**Trapps and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 8 to 15 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium or gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches

### Additional Components

Rock outcrop: 5 percent
Whitecow and similar soils: 5 percent
Yreka and similar soils: 5 percent

## 600A—Aeric Fluvaquents, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 4,780 to 4,900 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aeric Fluvaquents and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent

*Elevation:* 4,780 to 4,900 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Very cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Mixed alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 3.4 inches

### Additional Components

Water: 10 percent
Riverwash: 5 percent

## 632B—Bushong loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 3,600 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Bushong and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,600 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Canarway and similar soils: 8 percent
Blossberg and similar soils: 7 percent

## 634B—Blossberg loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Blossberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Bushong and similar soils: 5 percent
Flintcreek and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 635B—Tetonview loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Tetonview and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches

### Additional Components

Blossberg and similar soils: 3 percent
Nythar and similar soils: 3 percent
Poronto and similar soils: 3 percent
Saypo and similar soils: 3 percent
Saypo, saline and similar soils: 3 percent

## 637B—Poronto loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Poronto and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Terrace
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Blossberg and similar soils: 4 percent
Bushong and similar soils: 4 percent
Kleinschmidt and similar soils: 4 percent
Mannixlee and similar soils: 3 percent

## 645A—Mannixlee clay loam, 0 to 2 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,900 to 5,040 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Mannixlee and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 2 percent
*Elevation:* 4,900 to 5,040 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Bushong and similar soils: 5 percent
Poronto and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 646B—Danvers-Roy complex, 2 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,180 to 5,700 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Danvers and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,180 to 5,700 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 5,180 to 5,700 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Work and similar soils: 8 percent
Braziel and similar soils: 5 percent
Julius and similar soils: 2 percent

## 649B—Turrah silty clay loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 5,480 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Turrah and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 5,400 to 5,480 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Clayey alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 7.7 inches

### Additional Components

Mannixlee and similar soils: 5 percent
Poronto and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 676B—Finn loam, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,790 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Finn and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 5,790 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted

*Drainage class:* Very poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 5.9 inches

### Additional Components

Dunkleber and similar soils: 4 percent
Foolhen and similar soils: 4 percent
Mooseflat and similar soils: 4 percent
Kilgore and similar soils: 3 percent

## 680E—Comad-Rubble land complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 9,200 feet
*Mean annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 9,200 feet
*Effective annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rubble land**
*Composition:* 20 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Rock outcrop: 10 percent
Comad, greater slope and similar soils: 5 percent

## 680F—Comad-Rubble land complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 9,200 feet
*Mean annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 9,200 feet
*Effective annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rubble land**
*Composition:* 20 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Rock outcrop: 10 percent
Comad, greater slope and similar soils: 5 percent

## 680G—Rock outcrop-Comad complex, 45 to 80 percent slopes

### Map Unit Setting

*Elevation:* 8,400 to 9,200 feet
*Mean annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Rock outcrop**
*Composition:* 60 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

**Comad and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 45 to 80 percent

*Elevation:* 8,400 to 9,200 feet
*Effective annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Comad, lesser slope and similar soils: 10 percent
Evaro and similar soils: 5 percent

## 682E—Elve bouldery sandy loam, 4 to 25 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,400 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 25 percent
*Elevation:* 6,000 to 7,400 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Evaro and similar soils: 4 percent
Loberg and similar soils: 4 percent
Rubble land: 4 percent
Elve, greater slope and similar soils: 3 percent

## 682F—Elve bouldery sandy loam, 25 to 50 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,400 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 25 to 50 percent
*Elevation:* 6,400 to 7,400 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Elve, greater slope and similar soils: 5 percent
Evaro and similar soils: 5 percent
Rubble land: 5 percent

## 686A—Dougcliff mucky peat, loamy substratum, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,350 to 5,450 feet
*Mean annual precipitation:* 10 to 15 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Dougcliff and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Depression
- Flood plain
- Outwash plain
- Stream terrace

*Slope:* 0 to 2 percent
*Elevation:* 5,350 to 5,450 feet
*Effective annual precipitation:* 10 to 15 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic, unspecified over loamy alluvium
*Flooding:* Rare
*Water table:* Present
*Ponding duration:* Long
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Kleinschmidt and similar soils: 5 percent
Carten and similar soils: 3 percent
Wetsand and similar soils: 2 percent

## 696E—Worock gravelly loam, dry, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Evaro and similar soils: 4 percent
Loberg and similar soils: 4 percent
Rock outcrop: 4 percent
Danaher and similar soils: 3 percent

## 696F—Worock gravelly loam, dry, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,740 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,740 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Evaro and similar soils: 4 percent
Loberg and similar soils: 4 percent
Rock outcrop: 4 percent
Danaher and similar soils: 3 percent

## 697E—Waldbillig-Mooseflat complex, 4 to 25 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 8,440 feet
*Mean annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 6,400 to 8,440 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches

**Mooseflat, stony and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Drainageway
*Slope:* 4 to 8 percent
*Elevation:* 6,400 to 8,440 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones, 27 to 67 feet apart
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Waldbillig, greater slope and similar soils: 10 percent
Rubble land: 3 percent
Comad and similar soils: 2 percent

## 714E—Mooseflat-Mohaggin complex, 4 to 25 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mooseflat and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Drainageway
- Mountainbase on mountain

*Slope:* 4 to 25 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

**Mohaggin and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

### Additional Components

Mohaggin, greater slope and similar soils: 10 percent
Rubble land: 3 percent
Worock and similar soils: 2 percent

# 714F—Mooseflat-Mohaggin complex, 25 to 60 percent slopes

## Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Mooseflat and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Mountainbase on mountain
Sl*ope:* 25 to 50 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

**Mohaggin and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 25 to 60 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 15 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Bouldery ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

## Additional Components

Mohaggin, lesser slope and similar soils: 5 percent
Mooseflat, lesser slope and similar soils: 5 percent
Rubble land: 5 percent

## 724B—Con loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,550 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,920 to 5,550 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Anaconda and similar soils: 4 percent
Cetrack and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney and similar soils: 3 percent

## 724C—Con loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,550 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,920 to 5,550 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Anaconda and similar soils: 4 percent
Cetrack and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney and similar soils: 3 percent

## 724D—Con loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,550 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,920 to 5,550 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Anaconda and similar soils: 4 percent
Cetrack and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney and similar soils: 3 percent

## 732B—Beaverell loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,550 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Beaverell and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,920 to 5,550 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Anaconda and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent
Truchot and similar soils: 5 percent

## 735B—Tetonview-Blossberg loams, 0 to 4 percent slopes, rarely flooded

### Map Unit Setting

*Elevation:* 4,600 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 110 days

### Component Description

**Tetonview and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 110 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.9 inches

**Blossberg and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,800 feet

*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Bushong and similar soils: 4 percent
Gregson and similar soils: 4 percent
Mannixlee and similar soils: 4 percent
Poronto and similar soils: 3 percent

## 737B—Sixbeacon gravelly loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,500 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,920 to 5,500 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon, cobbly and similar soils: 5 percent

## 737C—Sixbeacon gravelly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,920 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon, cobbly and similar soils: 5 percent

## 737D—Sixbeacon gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,800 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,920 to 5,800 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 5 percent
Con and similar soils: 5 percent
Sixbeacon, cobbly and similar soils: 5 percent

## 739E—Tolbert-Wilspring-Rock outcrop complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Tolbert and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 4,920 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Wilspring and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Shoulder on hill
- Mountainflank on mountain

Sl*ope:* 15 to 35 percent
*Elevation:* 4,920 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Channery loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium derived from shale or unspecified gravelly colluvium derived from argillaceous limestone
*Flooding:* None
*Available water capacity:* Mainly 2.6 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Roy and similar soils: 5 percent
Tolbert, greater slope and similar soils: 5 percent
Work and similar soils: 5 percent

## 751C—Shawmut gravelly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Shawmut, greater slope and similar soils: 5 percent
Windham and similar soils: 5 percent

## 751D—Shawmut gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,400 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Shawmut, greater slope and similar soils: 5 percent
Tolbert and similar soils: 5 percent

## 751E—Shawmut gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Shawmut and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Wilspring and similar soils: 8 percent
Tolbert and similar soils: 3 percent
Braziel and similar soils: 2 percent
Shawmut, greater slope and similar soils: 2 percent

## 752D—Clasoil-Crackerville-Rock outcrop complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountainside
*Slope:* 8 to 15 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Clasoil, greater slope and similar soils: 5 percent
Martinsdale and similar soils: 5 percent

## 752E—Clasoil-Crackerville-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountainside
*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Clasoil, greater slope and similar soils: 5 percent
Martinsdale and similar soils: 5 percent

## 753E—Redchief-Copenhaver gravelly loams, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 6,400 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Redchief and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,400 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

**Copenhaver and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,600 to 6,400 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from basalt, or residuum weathered from andesite
*Flooding:* None
*Available water capacity:* Mainly 1.8 inches

### Additional Components

Copenhaver, extremely stony and similar soils: 8 percent
Libeg and similar soils: 5 percent
Rock outcrop: 2 percent

## 758F—Mishakal-Tolbert complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Mishakal and similar soils**
*Composition:* 70 percent
*Geomorphic description:*
- Side slope on hill
- Mountainflank on mountain

*Slope:* 35 to 60 percent

*Elevation:* 5,300 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Channery loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from argillite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

**Tolbert and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,300 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

### Additional Components

Rock outcrop: 5 percent
Roy and similar soils: 5 percent
Wilspring and similar soils: 5 percent

## 774F—Wilspring-Tolbert complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wilspring and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Backslope on hill
- Shoulder on hill
- Mountainflank on mountain

Sl*ope:* 35 to 60 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained

*Parent material:* Calcareous gravelly colluvium derived from shale or unspecified gravelly colluvium derived from argillaceous limestone
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

### Additional Components

Mishakal and similar soils: 5 percent
Wilspring, lesser slope and similar soils: 5 percent
Rock outcrop: 3 percent
Rubble land: 2 percent

## 774G—Wilspring-Rubble land complex, 50 to 75 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wilspring and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Backslope on hill
- Shoulder on hill
- Mountainflank on mountain

Sl*ope:* 50 to 75 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium derived from shale or unspecified gravelly colluvium derived from argillaceous limestone

*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rubble land**
*Composition:* 20 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Tolbert and similar soils: 10 percent
Mishakal and similar soils: 5 percent

## 776B—Finn-Water complex, 0 to 4 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 6,500 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Finn and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 6,000 to 6,500 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 5.9 inches

**Water**
*Composition:* 15 percent
*Definition:* Water includes streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.

### Additional Components

Mooseflat and similar soils: 6 percent
Foolhen and similar soils: 5 percent
Dunkleber and similar soils: 4 percent

## 782D—Evaro stony ashy loam, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 9,000 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 7,000 to 9,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

### Additional Components

Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent
Waldbillig and similar soils: 5 percent

## 782E—Evaro stony ashy loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 9,000 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 7,000 to 9,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

### Additional Components

Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent
Waldbillig and similar soils: 5 percent

## 782F—Evaro stony ashy loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 9,000 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,000 to 9,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

### Additional Components

Phillcher and similar soils: 5 percent
Rock outcrop: 5 percent
Waldbillig and similar soils: 5 percent

## 786E—Winkler gravelly loam, cool, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,700 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winkler and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,700 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

### Additional Components

Rock outcrop: 5 percent
Yreka and similar soils: 5 percent

## 791D—Mohaggin-Rubble land complex, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,200 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 7,800 to 9,200 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Rubble land**
*Composition:* 25 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Cowood and similar soils: 10 percent
Rock outcrop: 5 percent

## 791E—Mohaggin-Rubble land complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,200 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 7,800 to 9,200 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Rubble land**
*Composition:* 25 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Cowood and similar soils: 10 percent
Rock outcrop: 5 percent

## 791F—Mohaggin-Rubble land complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,200 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,800 to 9,200 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Rubble land**
*Composition:* 25 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Cowood and similar soils: 10 percent
Rock outcrop: 5 percent

## 791G—Mohaggin-Rubble land complex, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 7,800 to 9,200 feet
*Mean annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Mohaggin and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 7,800 to 9,200 feet
*Effective annual precipitation:* 22 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Rubble land**
*Composition:* 25 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Cowood and similar soils: 10 percent
Rock outcrop: 5 percent

## 797E—Waldbillig-Elve complex, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,000 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 5,800 to 8,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches

**Elve and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 5,800 to 8,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve, greater slope and similar soils: 6 percent
Evaro and similar soils: 5 percent
Loberg and similar soils: 4 percent

## 797F—Waldbillig-Elve complex, 25 to 50 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,000 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Moraine
Sl*ope:* 25 to 50 percent
*Elevation:* 5,800 to 8,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches

**Elve and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 25 to 50 percent
*Elevation:* 5,800 to 8,000 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve, lesser slope and similar soils: 6 percent
Evaro and similar soils: 5 percent
Loberg and similar soils: 4 percent

## 800B—Aridic Ustorthents, 1 to 4 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aridic Ustorthents and similar soils**
*Composition:* 85 percent
*Geomorphic description:* None assigned
*Slope:* 1 to 4 percent
*Elevation:* 5,080 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Very cobbly clay loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Beaverell and similar soils: 8 percent
Aridic Ustorthents, greater slope and similar soils: 7 percent

## 800C—Aridic Ustorthents, 4 to 8 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aridic Ustorthents and similar soils**
*Composition:* 85 percent
*Geomorphic description:* None assigned
*Slope:* 4 to 8 percent
*Elevation:* 5,080 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Very cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Beaverell and similar soils: 8 percent
Aridic Ustorthents, greater slope and similar soils: 7 percent

## 800D—Aridic Ustorthents, 8 to 15 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aridic Ustorthents and similar soils**
*Composition:* 85 percent
*Geomorphic description:* None assigned
*Slope:* 8 to 15 percent
*Elevation:* 5,080 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

*Surface layer texture:* Very cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Beaverell and similar soils: 8 percent
Aridic Ustorthents, lesser slope and similar soils: 7 percent

## 800E—Aridic Ustorthents, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,080 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Aridic Ustorthents and similar soils**
*Composition:* 85 percent
*Geomorphic description:* None assigned
*Slope:* 15 to 35 percent
*Elevation:* 5,080 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Very cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Danvers and similar soils: 8 percent
Aridic Ustorthents, lesser slope and similar soils: 7 percent

## 824E—Con-Sixbeacon cobbly loams, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

**Sixbeacon and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 15 to 35 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Con, calcareous and similar soils: 5 percent
Con, greater slope and similar soils: 5 percent
Varney and similar soils: 5 percent

## 824F—Con-Sixbeacon cobbly loams, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 4,000 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

**Sixbeacon and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Alluvial fan
Sl*ope:* 35 to 60 percent
*Elevation:* 4,000 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.6 inches

### Additional Components

Con, calcareous and similar soils: 8 percent
Varney and similar soils: 7 percent

## 834B—Blossberg loam, 0 to 4 percent slopes, rarely flooded

### Map Unit Setting

*Elevation:* 4,600 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Blossberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Dougcliff and similar soils: 4 percent
Gregson and similar soils: 4 percent
Mannixlee and similar soils: 4 percent
Bushong and similar soils: 3 percent

## 835B—Tetonview loam, 0 to 4 percent slopes, rarely flooded

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Tetonview and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Blossberg and similar soils: 3 percent
Bushong and similar soils: 3 percent
Dougcliff and similar soils: 3 percent
Saypo and similar soils: 3 percent
Turrah and similar soils: 3 percent

## 837B—Poronto loam, 0 to 4 percent slopes, rarely flooded

### Map Unit Setting

*Elevation:* 5,520 to 5,680 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Poronto and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent

*Elevation:* 5,520 to 5,680 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Blossberg and similar soils: 4 percent
Dougcliff and similar soils: 4 percent
Mannixlee and similar soils: 4 percent
Bushong and similar soils: 3 percent

## 839F—Windham-Lap-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Windham and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Alluvial fan
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium derived from limestone or gravelly colluvium derived from limestone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

**Lap and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain slope

*Slope:* 35 to 60 percent

*Elevation:* 5,600 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Wimper and similar soils: 8 percent
Winspect and similar soils: 7 percent

## 840D—Arlen-Caramon-Rock outcrop complex, 8 to 15 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Arlen and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from rhyolite or residuum weathered from tuff
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Caramon and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,000 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Clayey colluvium derived from rhyolite over residuum weathered from rhyolite
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Rock outcrop (tuff)**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Macabre and similar soils: 8 percent
Burrfoot and similar soils: 2 percent

## 840F—Arlen-Caramon-Rock outcrop complex, 15 to 60 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Arlen and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 15 to 60 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from rhyolite or residuum weathered from tuff
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Caramon and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 15 to 60 percent
*Elevation:* 5,200 to 6,000 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Clayey colluvium derived from rhyolite over residuum weathered from rhyolite
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Rock outcrop (tuff)**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Macabre and similar soils: 8 percent
Burrfoot and similar soils: 2 percent

## 846F—Roy-Tolbert complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,000 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainflank on mountain
- Mountainbase on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent

*Elevation:* 5,000 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Rock outcrop: 5 percent
Rubble land: 5 percent
Shawmut and similar soils: 5 percent

## 854E—Libeg-Monad-Copenhaver complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Monad and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Stream terrace
*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

**Copenhaver and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Libeg, greater slope and similar soils: 4 percent
Rock outcrop: 4 percent
Roy and similar soils: 4 percent
Libeg, cobbly and similar soils: 3 percent

## 854F—Libeg-Monad-Copenhaver complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Monad and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Stream terrace
*Slope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

**Copenhaver and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Libeg, very cobbly and similar soils: 4 percent
Rock outcrop: 4 percent
Roy and similar soils: 4 percent
Libeg, greater slope and similar soils: 3 percent

## 855A—Mannixlee-Blossberg complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 5,540 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Mannixlee and similar soils**
*Composition:* 45 percent

*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,400 to 5,540 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.8 inches

**Blossberg and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,400 to 5,540 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Bushong and similar soils: 4 percent
Dougcliff and similar soils: 4 percent
Poronto and similar soils: 4 percent
Gregson and similar soils: 3 percent

## 865F—Karloff gravelly ashy sandy loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,200 feet

*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

### Additional Components

Litag and similar soils: 8 percent
Danvers and similar soils: 3 percent
Nivean and similar soils: 2 percent
Rock outcrop (tuff): 2 percent

## 882E—Phillcher-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 7,600 to 9,100 feet
*Mean annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days

### Component Description

**Phillcher and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountaintop on mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 7,600 to 9,100 feet
*Effective annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.8 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 10 percent
Mohaggin and similar soils: 5 percent

## 882F—Phillcher-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,600 to 9,100 feet
*Mean annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days

### Component Description

**Phillcher and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountaintop on mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,600 to 9,100 feet
*Effective annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.8 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 10 percent
Mohaggin and similar soils: 5 percent

## 882G—Phillcher-Rock outcrop complex, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 7,600 to 9,100 feet
*Mean annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days

### Component Description

**Phillcher and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountaintop on mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 7,600 to 9,100 feet
*Effective annual precipitation:* 26 to 40 inches
*Frost-free period:* 20 to 40 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained

*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.8 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 10 percent
Mohaggin and similar soils: 5 percent

## 888E—Caramon ashy loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Caramon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Clayey colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.6 inches

### Additional Components

Burrfoot and similar soils: 6 percent
Danvers and similar soils: 5 percent
Nivean and similar soils: 2 percent
Work and similar soils: 2 percent

## 889E—Karloff ashy loam, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,900 to 6,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Coslaw and similar soils: 10 percent
Bendoh and similar soils: 5 percent

## 897E—Evaro gravelly ashy loam, moist, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 7,000 to 8,200 feet
*Mean annual precipitation:* 20 to 25 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Evaro and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 7,000 to 8,200 feet
*Effective annual precipitation:* 20 to 25 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Holloway and similar soils: 4 percent
Rock outcrop: 4 percent
Worock and similar soils: 4 percent
Elve and similar soils: 3 percent

## 903B—Foolhen loam, 0 to 4 percent slopes, rarely flooded

### Map Unit Setting

*Elevation:* 5,960 to 6,800 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Foolhen and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 5,960 to 6,800 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

### Additional Components

Dunkleber and similar soils: 4 percent
Finn and similar soils: 4 percent
Mooseflat and similar soils: 4 percent
Kilgore and similar soils: 3 percent

## 914A—Kilgore-Mooseflat complex, 0 to 2 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 6,650 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Kilgore and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain

*Slope:* 0 to 2 percent
*Elevation:* 5,900 to 6,650 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 4.5 inches

**Mooseflat and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,900 to 6,650 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Foolhen and similar soils: 10 percent
Finn and similar soils: 5 percent

## 922E—Judco gravelly ashy sandy clay loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Judco and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Base slope on hill
- Side slope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

### Additional Components

Coslaw and similar soils: 5 percent
Elve and similar soils: 5 percent
Copenhaver and similar soils: 3 percent
Rock outcrop: 2 percent

## 924E—Con-Sixbeacon cobbly loams, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Con and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,920 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.5 inches

**Sixbeacon and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,920 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Beaverell and similar soils: 6 percent
Anaconda and similar soils: 5 percent
Varney and similar soils: 4 percent

## 932F—Sula-Shook-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Sula and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Shook and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountainbase on mountain
Sl*ope:* 35 to 60 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 30 to 40 inches
*Drainage class:* Well drained
*Parent material:* Coarse-loamy colluvium derived from granite or coarse-loamy residuum weathered from granite
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

**Rock outcrop**
*Composition:* 30 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Libeg and similar soils: 5 percent
Maurice and similar soils: 5 percent

## 933E—Burrfoot-Nivean complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,100 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Burrfoot and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Footslope on hillside
*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 3.6 inches

**Nivean and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.9 inches

### Additional Components

Danvers and similar soils: 3 percent
Rock outcrop: 2 percent

## 934B—Cetrack loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Cetrack and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Outwash plain
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,920 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium over sandy and gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches

### Additional Components

Con and similar soils: 5 percent
Saypo and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 935B—Anaconda sandy loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent

*Elevation:* 4,800 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 935C—Anaconda sandy loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,800 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 935D—Anaconda sandy loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,800 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.8 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 935E—Anaconda sandy loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 5,300 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Anaconda and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 4,800 to 5,300 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches

### Additional Components

Con and similar soils: 5 percent
Gregson and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 937B—Sixbeacon cobbly loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,400 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,920 to 5,400 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 8 percent
Con and similar soils: 7 percent

## 937C—Sixbeacon cobbly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent

*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,920 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 8 percent
Con and similar soils: 7 percent

## 937D—Sixbeacon cobbly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,920 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Sixbeacon and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,920 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Anaconda and similar soils: 8 percent
Con and similar soils: 7 percent

# 938D—Lap-Windham loams, 4 to 15 percent slopes, very stony, moderately impacted

## Map Unit Setting

*Elevation:* 5,300 to 5,700 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Lap and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain slope

*Slope:* 4 to 15 percent
*Elevation:* 5,300 to 5,700 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 1.5 inches

**Windham and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Alluvial fan
- Mountainflank on mountain
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,300 to 5,700 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium derived from limestone or gravelly colluvium derived from limestone
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

## Additional Components

Roy and similar soils: 8 percent
Shawmut and similar soils: 4 percent
Rock outcrop: 3 percent

# 939F—Windham-Lap-Rock outcrop complex, 15 to 45 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,400 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Windham and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Mountainflank on mountain
- Stream terrace

*Slope:* 15 to 45 percent
*Elevation:* 5,400 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium derived from limestone or gravelly colluvium derived from limestone
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches

**Lap and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain slope

*Slope:* 15 to 25 percent
*Elevation:* 5,400 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

## Additional Components

Work and similar soils: 10 percent

# 944F—Work-Tolbert-Rock outcrop complex, 35 to 60 percent slopes, severely impacted

## Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Work and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous slope alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Extremely channery clay loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

## Additional Components

Caramon and similar soils: 8 percent
Beaverell and similar soils: 5 percent
Danvers and similar soils: 2 percent

## 945B—Saypo loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,900 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Saypo and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,900 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 8.1 inches

### Additional Components

Con and similar soils: 8 percent
Beaverell and similar soils: 7 percent

## 946E—Roy-Tolbert-Rock outcrop complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 55 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Extremely channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Roy, greater slope and similar soils: 10 percent
Mishakal and similar soils: 3 percent
Rubble land: 2 percent

## 946F—Roy-Tolbert-Rock outcrop complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Tolbert and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Extremely channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Roy, lesser slope and similar soils: 8 percent
Mishakal and similar soils: 5 percent
Danvers and similar soils: 2 percent

## 951F—Roy-Shawmut-Danvers complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,000 to 6,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,000 feet

*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Shawmut and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Danvers and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,000 to 6,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Braziel and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Staad and similar soils: 5 percent

## 954E—Libeg-Copenhaver-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Copenhaver and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Adel and similar soils: 4 percent
Mollet and similar soils: 4 percent
Monad and similar soils: 4 percent
Redchief and similar soils: 3 percent

## 954F—Libeg-Copenhaver-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Copenhaver and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Adel and similar soils: 4 percent
Mollet and similar soils: 4 percent
Monad and similar soils: 4 percent
Redchief and similar soils: 3 percent

## 958F—Mishakal loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Mishakal and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Side slope on hill
- Mountainflank on mountain

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from argillite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

### Additional Components

Tolbert and similar soils: 6 percent
Wilspring and similar soils: 5 percent
Danvers and similar soils: 3 percent
Rock outcrop: 1 percent

## 966D—Macabre-Arlen complex, 8 to 15 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Macabre and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 3.3 inches

**Arlen and similar soils**
*Composition:* 25 percent

*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from tuff or residuum weathered from rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Julius and similar soils: 10 percent
Rock outcrop: 3 percent
Macabre, greater slope and similar soils: 2 percent

## 966E—Macabre-Arlen complex, 15 to 35 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,000 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Macabre and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.3 inches

**Arlen and similar soils**
*Composition:* 25 percent

*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from tuff or residuum weathered from rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Caramon and similar soils: 10 percent
Rock outcrop: 5 percent

## 975F—Hanson-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,700 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Hanson and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,700 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Rock outcrop**
*Composition:* 40 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Tibson and similar soils: 10 percent

# 977E—Work-Julius-Arlen complex, 15 to 35 percent slopes, severely impacted

## Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Work and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous slope alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

**Julius and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Arlen and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from tuff or residuum weathered from rhyolite

*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Caramon and similar soils: 8 percent
Rock outcrop: 2 percent

## 977F—Work-Julius-Arlen complex, 35 to 60 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Work and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous slope alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

**Julius and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly clay loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Arlen and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from rhyolite or residuum weathered from tuff
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Caramon and similar soils: 7 percent
Rock outcrop: 3 percent

## 982E—Elve-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 8 percent
Worock and similar soils: 7 percent

## 982F—Elve-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 8 percent
Worock and similar soils: 7 percent

## 982G—Elve-Rock outcrop complex, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained

*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 8 percent
Worock and similar soils: 7 percent

## 988F—Whitecow-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 6,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Whitecow and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 6,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 30 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 6 percent
Yreka and similar soils: 5 percent
Windham and similar soils: 4 percent

## 992E—Whitore-Rock outcrop complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,600 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 8,600 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Rock outcrop**
*Composition:* 40 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Helmville and similar soils: 4 percent
Whitecow, moderately deep and similar soils: 4 percent
Whitecow and similar soils: 4 percent
Elve and similar soils: 3 percent

## 992F—Whitore-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,600 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 8,600 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Rock outcrop**
*Composition:* 40 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Helmville and similar soils: 4 percent
Whitecow, moderately deep and similar soils: 4 percent
Whitecow and similar soils: 4 percent
Elve and similar soils: 3 percent

## 992G—Whitore-Rock outcrop complex, 60 to 80 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 8,600 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 80 percent
*Elevation:* 5,800 to 8,600 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 4.8 inches

**Rock outcrop**
*Composition:* 40 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Elve and similar soils: 4 percent
Helmville and similar soils: 4 percent
Worock and similar soils: 4 percent
Rubble land: 3 percent

## 996F—Worock-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Elve and similar soils: 4 percent
Evaro and similar soils: 4 percent
Loberg and similar soils: 4 percent
Rubble land: 3 percent

## 997E—Waldbillig stony ashy very fine sandy loam, 8 to 25 percent slopes

### Map Unit Setting

*Elevation:* 7,600 to 8,600 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Waldbillig and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
Sl*ope:* 8 to 25 percent
*Elevation:* 7,600 to 8,600 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony ashy very fine sandy loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Sandy and silty volcanic ash over gravelly till, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Waldbillig, gravelly and similar soils: 10 percent
Mooseflat and similar soils: 3 percent
Rubble land: 2 percent

## 1021D—Maurice cobbly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Maurice and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Libeg and similar soils: 10 percent
Redchief and similar soils: 5 percent

## 1025D—Staad silty clay loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Staad and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Drainageway

Sl*ope:* 8 to 15 percent
*Elevation:* 4,700 to 5,800 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 10.6 inches

### Additional Components

Martinsdale and similar soils: 5 percent
Perma and similar soils: 5 percent
Quigley and similar soils: 5 percent

## 1025F—Copenhaver, stony-Libeg, very stony-Rock outcrop complex, 15 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 7,200 to 7,800 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Copenhaver and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 45 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Libeg and similar soils**
*Composition:* 35 percent

*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 25 to 60 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 10 percent
Redfern and similar soils: 3 percent
Illiano and similar soils: 2 percent

## 1039D—Winspect gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,500 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 8 to 15 percent
*Elevation:* 5,400 to 6,500 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 5 percent
Shawmut and similar soils: 5 percent
Wimper and similar soils: 5 percent

## 1039E—Winspect gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,500 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,400 to 6,500 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 5 percent
Shawmut and similar soils: 5 percent
Winspect, cobbly and similar soils: 5 percent

## 1039F—Winspect gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,500 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Winspect and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent

*Elevation:* 5,400 to 6,500 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from limestone
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Rock outcrop: 5 percent
Shawmut and similar soils: 5 percent
Wimper and similar soils: 5 percent

## 1041E—Perma gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Braziel and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Winspect and similar soils: 5 percent

## 1041F—Perma gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Braziel and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Winspect and similar soils: 5 percent

## 1046C—Roy gravelly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,180 to 6,800 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Roy and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,180 to 6,800 feet
*Effective annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

### Additional Components

Danvers and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 1052B—Martinsdale loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 1052C—Martinsdale loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Martinsdale and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 9.2 inches

### Additional Components

Danvers and similar soils: 5 percent
Quigley and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 1054C—Libeg gravelly loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 4 to 8 percent
*Elevation:* 5,400 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Finn and similar soils: 5 percent
Mollet and similar soils: 5 percent

## 1054D—Libeg gravelly loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 8 to 15 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 1054E—Libeg gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 7,800 feet
*Mean annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,400 to 7,800 feet
*Effective annual precipitation:* 15 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Mollet and similar soils: 5 percent
Rock outcrop: 5 percent

## 1054F—Libeg gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 8,200 feet
*Mean annual precipitation:* 15 to 25 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,400 to 8,200 feet
*Effective annual precipitation:* 15 to 25 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Copenhaver and similar soils: 5 percent
Redchief and similar soils: 5 percent
Rock outcrop: 5 percent

## 1060E—Quigley loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,360 to 6,020 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Quigley and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Outwash plain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,360 to 6,020 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 6.9 inches

### Additional Components

Danvers and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Shawmut and similar soils: 5 percent

## 1076F—Tibson gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 6,400 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 6,400 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Levengood and similar soils: 8 percent
Maciver and similar soils: 7 percent

## 1081F—Holloway gravelly ashy silt loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Sandy and silty volcanic ash over gravelly colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

### Additional Components

Evaro and similar soils: 8 percent
Rumsey and similar soils: 7 percent

## 1084F—Helmville cobbly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,400 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Helmville and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Relyea and similar soils: 5 percent
Rock outcrop: 5 percent
Whitore and similar soils: 5 percent

## 1096D—Worock gravelly loam, 4 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,300 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,300 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Loberg and similar soils: 4 percent
Danaher and similar soils: 3 percent
Evaro and similar soils: 3 percent

## 1096E—Worock gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Loberg and similar soils: 4 percent
Danaher and similar soils: 3 percent
Evaro and similar soils: 3 percent

## 1096F—Worock gravelly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 8,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 8,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Elve and similar soils: 5 percent
Evaro and similar soils: 4 percent
Danaher and similar soils: 3 percent
Loberg and similar soils: 3 percent

# 1110A—Carten-Wetsand complex, 0 to 2 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 4,200 to 6,000 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

## Component Description

**Carten and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,200 to 6,000 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.4 inches

**Wetsand and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 4,200 to 6,000 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Salt affected:* Saline within 30 inches
*Available water capacity:* Mainly 3.8 inches

## Additional Components

Water: 6 percent
Riverwash: 5 percent
Carten, greater slope and similar soils: 4 percent

## 1141F—Perma gravelly loam, 35 to 60 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Braziel and similar soils: 8 percent
Shawmut and similar soils: 7 percent

## 1152C—Clasoil sandy loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 3,500 to 5,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Alluvium and/or colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

### Additional Components

Crackerville and similar soils: 8 percent
Clasoil, greater slope and similar soils: 7 percent

## 1152D—Clasoil sandy loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,200 to 6,200 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 6,200 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

### Additional Components

Crackerville and similar soils: 5 percent
Martinsdale and similar soils: 5 percent
Rock outcrop: 5 percent

## 1236B—Varney sandy clay loam, 2 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 2 to 4 percent
*Elevation:* 4,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Anaconda and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 1236C—Varney sandy clay loam, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,000 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 4,000 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches

### Additional Components

Con and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 1236D—Varney sandy clay loam, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Varney and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 4,600 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

### Additional Components

Anaconda and similar soils: 4 percent
Sixbeacon and similar soils: 4 percent
Varney, greater slope and similar soils: 4 percent
Cetrack and similar soils: 3 percent

## 1242E—Braziel gravelly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 6,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Braziel and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent

*Elevation:* 5,600 to 6,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanics
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Perma and similar soils: 5 percent
Shawmut and similar soils: 5 percent
Staad and similar soils: 5 percent

## 1276D—Tibson stony loam, 2 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 2 to 15 percent
*Elevation:* 5,800 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Libeg and similar soils: 10 percent
Maurice and similar soils: 5 percent

# 1314A—Kilgore-Foolhen-Mooseflat complex, 0 to 2 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,700 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Kilgore and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 4.5 inches

**Foolhen and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 7.1 inches

**Mooseflat and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 5,700 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium

*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 4.8 inches

### Additional Components

Dunkleber and similar soils: 8 percent
Water: 7 percent

## 1338F—Perma cobbly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,100 to 5,900 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Perma and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Moraine
- Mountainbase on mountain
- Outwash plain

*Slope:* 35 to 60 percent
*Elevation:* 5,100 to 5,900 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Dominic and similar soils: 8 percent
Wimper and similar soils: 7 percent

## 1392E—Whitore cobbly loam, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,200 to 7,800 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent

*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

## 1392F—Whitore cobbly loam, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,200 to 7,800 feet
*Mean annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Whitore and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 40 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Very calcareous gravelly colluvium derived from limestone, unspecified
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

### Additional Components

Helmville and similar soils: 8 percent
Rock outcrop: 7 percent

# 1442E—Braziel-Tolbert complex, 15 to 35 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 3,800 to 5,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Braziel and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Tolbert and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain
Sl*ope:* 15 to 35 percent
*Elevation:* 3,800 to 5,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.7 inches

## Additional Components

Braziel, greater slope and similar soils: 3 percent
Crackerville and similar soils: 3 percent
Perma and similar soils: 3 percent
Rock outcrop: 3 percent
Roy and similar soils: 3 percent

# 1446C—Danvers-Roy complex, 4 to 8 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,200 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Danvers and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 4 to 8 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

## Additional Components

Braziel and similar soils: 6 percent
Shawmut and similar soils: 6 percent
Winspect and similar soils: 3 percent

# 1446D—Danvers-Roy complex, 8 to 15 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,200 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Danvers and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainflank on mountain
- Mountainbase on mountain
- Stream terrace

*Slope:* 8 to 15 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

## Additional Components

Martinsdale and similar soils: 5 percent
Winspect and similar soils: 5 percent
Braziel and similar soils: 3 percent
Shawmut and similar soils: 2 percent

# 1446E—Danvers-Roy complex, 15 to 35 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,200 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Danvers and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainflank on mountain
- Mountainbase on mountain
- Stream terrace

*Slope:* 15 to 35 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

## Additional Components

Martinsdale and similar soils: 5 percent
Winspect and similar soils: 5 percent
Braziel and similar soils: 3 percent
Shawmut and similar soils: 2 percent

# 1446F—Danvers-Roy complex, 35 to 60 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,200 to 5,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Danvers and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 35 to 45 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey calcareous alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.6 inches

**Roy and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain
- Mountainflank on mountain
- Stream terrace

*Slope:* 35 to 60 percent
*Elevation:* 5,200 to 5,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 4.9 inches

## Additional Components

Martinsdale and similar soils: 5 percent
Winspect and similar soils: 5 percent
Braziel and similar soils: 3 percent
Shawmut and similar soils: 2 percent

# 1454E—Libeg-Macabre-Redchief complex, 15 to 35 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,600 to 6,600 feet
*Mean annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 90 days

## Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Macabre and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

**Redchief and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Backslope on hill
- Mountainbase on mountain

Slope*:* 15 to 35 percent
*Elevation:* 5,600 to 6,600 feet
*Effective annual precipitation:* 15 to 22 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

### Additional Components

Adel and similar soils: 4 percent
Monad and similar soils: 4 percent
Rock outcrop: 4 percent
Mollet and similar soils: 3 percent

## 1482E—Elve gravelly loam, dry, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Loberg and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 1482F—Elve gravelly loam, dry, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,000 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,000 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

### Additional Components

Loberg and similar soils: 5 percent
Rock outcrop: 5 percent
Worock and similar soils: 5 percent

## 1533B—Pozega silty clay loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Pozega and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Outwash plain
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Silty clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Coarse-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Salt affected:* Saline within 30 inches
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 8.4 inches

### Additional Components

Saypo and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 1537B—Truchot gravelly loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,800 to 4,900 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Truchot and similar soils**
*Composition:* 85 percent
*Geomorphic description:*
- Alluvial fan
- Stream terrace

*Slope:* 0 to 4 percent
*Elevation:* 4,800 to 4,900 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Kleinschmidt and similar soils: 5 percent
Poronto and similar soils: 5 percent
Sixbeacon and similar soils: 5 percent

## 1552C—Clasoil-Crackerville complex, 4 to 8 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,000 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountainside
*Slope:* 4 to 8 percent

*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 4 to 8 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Martinsdale and similar soils: 8 percent
Rock outcrop: 7 percent

## 1552D—Clasoil-Crackerville complex, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,000 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountainside
*Slope:* 8 to 15 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 8 to 15 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Martinsdale and similar soils: 8 percent
Rock outcrop: 7 percent

## 1552E—Clasoil-Crackerville complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,000 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 50 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 7.2 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,000 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Martinsdale and similar soils: 8 percent
Rock outcrop: 7 percent

## 1562B—Carten loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,000 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Carten and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Outwash plain
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,000 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Fine-loamy alluvium over sandy and gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Gregson and similar soils: 5 percent
Truchot and similar soils: 5 percent
Wetsand and similar soils: 5 percent

## 1580E—Comad-Elkner complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,300 to 8,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Elkner and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Rock outcrop: 5 percent
Sandy clay loam subsoils and similar soils: 5 percent

## 1580F—Comad-Elkner complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,300 to 8,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Elkner and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,300 to 8,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Stony sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Coarse-loamy colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches

### Additional Components

Comad, greater slope and similar soils: 5 percent
Rock outcrop: 5 percent

## 1582D—Elve-Rock outcrop complex, 8 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 8,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent
*Elevation:* 5,600 to 8,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained

*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Dunkleber and similar soils: 5 percent
Mohaggin and similar soils: 5 percent
Phillcher and similar soils: 5 percent

## 1596E—Worock-Loberg complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Loberg and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 15 to 35 percent
*Elevation:* 5,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

### Additional Components

Danaher and similar soils: 6 percent
Elve and similar soils: 3 percent
Foolhen and similar soils: 3 percent
Rock outcrop: 3 percent

## 1634B—Blossberg loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 3,800 to 5,200 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Blossberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,200 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Bushong and similar soils: 5 percent
Flintcreek and similar soils: 5 percent
Tetonview and similar soils: 5 percent

## 1635B—Tetonview loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Tetonview and similar soils**
*Composition:* 85 percent

*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches

### Additional Components

Blossberg and similar soils: 3 percent
Nythar and similar soils: 3 percent
Poronto and similar soils: 3 percent
Saypo and similar soils: 3 percent
Saypo, saline and similar soils: 3 percent

## 1637B—Poronto loam, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 4,700 to 5,600 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Poronto and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Terrace
*Slope:* 0 to 4 percent
*Elevation:* 4,700 to 5,600 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Gravelly alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Blossberg and similar soils: 4 percent
Bushong and similar soils: 4 percent
Kleinschmidt and similar soils: 4 percent
Mannixlee and similar soils: 3 percent

## 1680F—Comad-Rubble land complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,400 to 9,200 feet
*Mean annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Comad and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 9,200 feet
*Effective annual precipitation:* 20 to 35 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely bouldery sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Sandy and gravelly colluvium derived from granite
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rubble land**
*Composition:* 20 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Rock outcrop: 10 percent
Comad, greater slope and similar soils: 5 percent

## 1735B—Tetonview-Blossberg loams, 0 to 4 percent slopes, rarely flooded, moderately impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 110 days

### Component Description

**Tetonview and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 110 days
*Surface layer texture:* Loam

*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Fine-loamy calcareous alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.9 inches

**Blossberg and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Bushong and similar soils: 4 percent
Gregson and similar soils: 4 percent
Mannixlee and similar soils: 4 percent
Poronto and similar soils: 3 percent

## 1752E—Clasoil-Crackerville-Rock outcrop complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,100 to 6,400 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Clasoil and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountainside
*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium derived from granite or fine-loamy colluvium derived from granite
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 7.5 inches

**Crackerville and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Backslope on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,100 to 6,400 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Clasoil, greater slope and similar soils: 5 percent
Martinsdale and similar soils: 5 percent

## 1774F—Wilspring-Tolbert complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wilspring and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Backslope on hill
- Shoulder on hill
- Mountainflank on mountain

Sl*ope:* 35 to 60 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium derived from shale or unspecified gravelly colluvium derived from argillaceous limestone

*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Tolbert and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Mountaintop on mountain
- Mountain slope

Sl*ope:* 35 to 60 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very channery loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

### Additional Components

Mishakal and similar soils: 5 percent
Wilspring, lesser slope and similar soils: 5 percent
Rock outcrop: 3 percent
Rubble land: 2 percent

## 1774G—Wilspring-Rubble land complex, 50 to 75 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,600 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Wilspring and similar soils**
*Composition:* 65 percent
*Geomorphic description:*
- Backslope on hill
- Shoulder on hill
- Mountainflank on mountain

Sl*ope:* 50 to 75 percent
*Elevation:* 5,400 to 6,600 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Calcareous gravelly colluvium derived from shale or unspecified gravelly colluvium derived from argillaceous limestone
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rubble land**
*Composition:* 20 percent
*Definition:* Rubble land consists of areas of boulders, stones, and cobbles. Commonly, rubble land is at the base of mountains, hills, and escarpments but some areas are deposits of boulders, stones, and cobbles left on mountain slopes by glaciation.

### Additional Components

Tolbert and similar soils: 10 percent
Mishakal and similar soils: 5 percent

## 1834B—Blossberg loam, 0 to 4 percent slopes, rarely flooded, moderately impacted

### Map Unit Setting

*Elevation:* 4,600 to 5,600 feet
*Mean annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days

### Component Description

**Blossberg and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 4,600 to 5,600 feet
*Effective annual precipitation:* 10 to 14 inches
*Frost-free period:* 90 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.2 inches

### Additional Components

Dougcliff and similar soils: 4 percent
Gregson and similar soils: 4 percent
Mannixlee and similar soils: 4 percent
Bushong and similar soils: 3 percent

## 1835B—Tetonview loam, 0 to 4 percent slopes, rarely flooded, moderately impacted

### Map Unit Setting

*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days

### Component Description

**Tetonview and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 3,800 to 5,800 feet
*Effective annual precipitation:* 10 to 19 inches
*Frost-free period:* 70 to 105 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 8.8 inches

### Additional Components

Blossberg and similar soils: 3 percent
Bushong and similar soils: 3 percent
Dougcliff and similar soils: 3 percent
Saypo and similar soils: 3 percent
Turrah and similar soils: 3 percent

## 1854E—Libeg-Monad-Copenhaver complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Monad and similar soils**
*Composition:* 25 percent

*Geomorphic description:* Stream terrace
*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

**Copenhaver and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from basalt, or residuum weathered from andesite
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Libeg, greater slope and similar soils: 4 percent
Rock outcrop: 4 percent
Roy and similar soils: 4 percent
Libeg, cobbly and similar soils: 3 percent

## 1854F—Libeg-Monad-Copenhaver complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,600 feet
*Mean annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches

**Monad and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Stream terrace
*Slope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Fine-loamy alluvium
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

**Copenhaver and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,300 to 6,600 feet
*Effective annual precipitation:* 18 to 23 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

### Additional Components

Libeg, very cobbly and similar soils: 4 percent
Rock outcrop: 4 percent
Roy and similar soils: 4 percent
Libeg, greater slope and similar soils: 3 percent

## 1954E—Libeg-Copenhaver-Rock outcrop complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Copenhaver and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from basalt, or residuum weathered from andesite
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Adel and similar soils: 4 percent
Mollet and similar soils: 4 percent
Monad and similar soils: 4 percent
Redchief and similar soils: 3 percent

## 1954F—Libeg-Copenhaver-Rock outcrop complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Libeg and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Copenhaver and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 35 to 60 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Extremely stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Flooding:* None
*Available water capacity:* Mainly 1.3 inches

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Adel and similar soils: 4 percent
Mollet and similar soils: 4 percent
Monad and similar soils: 4 percent
Redchief and similar soils: 3 percent

## 1982E—Elve-Rock outcrop complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 8 percent
Worock and similar soils: 7 percent

## 1982F—Elve-Rock outcrop complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,800 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Evaro and similar soils: 8 percent
Worock and similar soils: 7 percent

## 1996F—Worock-Rock outcrop complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Elve and similar soils: 4 percent
Evaro and similar soils: 4 percent
Loberg and similar soils: 4 percent
Rubble land: 3 percent

## 1996G—Worock-Rock outcrop complex, 60 to 80 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,400 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope

*Slope:* 60 to 80 percent
*Elevation:* 6,400 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Rock outcrop**
*Composition:* 35 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Elve and similar soils: 4 percent
Evaro and similar soils: 4 percent
Rubble land: 4 percent
Loberg and similar soils: 3 percent

## 5001E—Bendoh-Karloff-Eremis complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,600 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Bendoh and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,600 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Karloff and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent

*Elevation:* 6,600 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Eremis and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 6,600 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

### Additional Components

Illiano and similar soils: 5 percent
Rock outcrop: 3 percent
Judco and similar soils: 2 percent

## 5002F—Coslaw-Rock outcrop association, 15 to 60 percent slopes, severely impacted

### Map Unit Setting

*Elevation:* 5,600 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Coslaw and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 15 to 60 percent
*Elevation:* 5,600 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy sandy loam

*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Flooding:* None
*Available water capacity:* Mainly 1.5 inches

**Rock outcrop (tuff)**
*Composition:* 30 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Bendoh and similar soils: 8 percent
Illiano and similar soils: 7 percent
Eremis and similar soils: 5 percent
Karloff and similar soils: 5 percent

## 5003D—Daras-Bendoh-Karloff complex, 4 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,300 to 6,900 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Daras and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Hillside
- Mountain slope

*Slope:* 4 to 15 percent
*Elevation:* 6,300 to 6,900 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.7 inches

**Bendoh and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,300 to 6,900 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam

*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Karloff and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 4 to 15 percent
*Elevation:* 6,300 to 6,900 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

### Additional Components

Eremis and similar soils: 5 percent
Illiano and similar soils: 3 percent
Coslaw and similar soils: 2 percent

## 5005C—Liart-Mooseflat-Tibkey complex, 0 to 4 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,300 to 6,800 feet
*Mean annual precipitation:* 15 to 24 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Liart and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Base slope on flood plain
- Mountainbase on mountain

*Slope:* 0 to 4 percent
*Elevation:* 6,300 to 6,800 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Fine-loamy alluvium
*Flooding:* Occasional

*Water table:* Present
*Available water capacity:* Mainly 10.0 inches

**Mooseflat and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 6,300 to 6,800 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Mucky loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 5.4 inches

**Tibkey and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Drainageway
*Slope:* 1 to 4 percent
*Elevation:* 6,300 to 6,800 feet
*Effective annual precipitation:* 15 to 24 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Gravelly alluvium
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 6.3 inches

### Additional Components

Bendoh and similar soils: 5 percent

## 5006D—Bendoh-Eremis-Karloff complex, 2 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,200 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Bendoh and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 2 to 15 percent
*Elevation:* 6,200 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Eremis and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 2 to 15 percent
*Elevation:* 6,200 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Karloff and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 4 to 15 percent
*Elevation:* 6,200 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

## Additional Components

Vitroff and similar soils: 6 percent
Coslaw and similar soils: 5 percent
Figaro and similar soils: 4 percent

# 5007E—Karloff-Figaro-Bendoh complex, 8 to 25 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 6,400 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

## Component Description

**Karloff and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 25 percent
*Elevation:* 6,400 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Figaro and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Footslope on hill
- Mountain slope

*Slope:* 8 to 25 percent
*Elevation:* 6,400 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Cobbly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Clayey alluvium or clayey slope alluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 8.1 inches

**Bendoh and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 6,400 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam

*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

### Additional Components

Eremis and similar soils: 4 percent
Coslaw and similar soils: 3 percent
Vitroff and similar soils: 2 percent
Liart and similar soils: 1 percent

## 5008D—Elve-Bendoh-Mooseflat complex, 4 to 25 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,100 to 7,000 feet
*Mean annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 6,100 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Mooseflat and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Drainageway
*Slope:* 4 to 15 percent
*Elevation:* 6,100 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Mucky silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.4 inches

**Bendoh and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 6,100 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Cobbly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

### Additional Components

Eremis and similar soils: 4 percent
Coslaw and similar soils: 3 percent
Liart and similar soils: 3 percent

## 5008E—Elve-Bendoh-Mooseflat complex, 8 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,100 to 7,200 feet
*Mean annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,100 to 7,200 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Bendoh and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,100 to 7,200 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Cobbly ashy loam

*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Mooseflat and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Drainageway
*Slope:* 8 to 25 percent
*Elevation:* 6,100 to 7,200 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Mucky silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 5.4 inches

### Additional Components

Coslaw and similar soils: 5 percent
Eremis and similar soils: 3 percent
Liart and similar soils: 2 percent

## 5009E—Vitroff-Elve-Karloff complex, 8 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,600 to 6,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Vitroff and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 50 to 70 days
*Surface layer texture:* Very cobbly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Elve and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 35 percent
*Elevation:* 6,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.5 inches

**Karloff and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 8 to 35 percent
*Elevation:* 6,600 to 6,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

### Additional Components

Coslaw and similar soils: 4 percent
Eremis and similar soils: 3 percent
Mooseflat and similar soils: 2 percent
Illiano and similar soils: 1 percent

## 5010E—Karloff-Bendoh-Eremis complex, 8 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,480 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Karloff and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 8 to 35 percent
*Elevation:* 6,480 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Bendoh and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 35 percent
*Elevation:* 6,480 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Eremis and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Footslope on hill
- Mountain slope

*Slope:* 8 to 15 percent
*Elevation:* 6,480 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

## Additional Components

Coslaw and similar soils: 6 percent
Vitroff and similar soils: 5 percent
Illiano and similar soils: 4 percent
Elve and similar soils: 3 percent
Rock outcrop: 2 percent

# 5011E—Karloff-Illiano-Rock outcrop complex, 8 to 35 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 6,000 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

## Component Description

**Karloff and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 8 to 35 percent
*Elevation:* 6,000 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Illiano and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 15 to 35 percent
*Elevation:* 6,000 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

## Additional Components

Bendoh and similar soils: 6 percent
Worock and similar soils: 4 percent

Finn and similar soils: 3 percent
Elve and similar soils: 2 percent

## 5011F—Karloff-Illiano-Rock outcrop complex, 35 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,000 to 7,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 6,000 to 7,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Illiano and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 60 percent
*Elevation:* 6,000 to 7,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Bendoh and similar soils: 6 percent
Loberg and similar soils: 5 percent
Worock and similar soils: 4 percent
Finn and similar soils: 3 percent
Rubble land: 2 percent

## 5012E—Worock-Finn-Cujob complex, 1 to 25 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,600 to 7,600 feet
*Mean annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Worock and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 25 percent
*Elevation:* 6,600 to 7,600 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.1 inches

**Finn and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Drainageway
*Slope:* 1 to 8 percent
*Elevation:* 6,600 to 7,600 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 5.7 inches

**Cujob and similar soils**
*Composition:* 20 percent

*Geomorphic description:*
- Depression
- Mountain slope
- Slump

*Slope:* 1 to 4 percent
*Elevation:* 6,600 to 7,600 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Mucky silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* None
*Water table:* Present
*Ponding duration:* Long
*Available water capacity:* Mainly 6.1 inches

### Additional Components

Coslaw and similar soils: 5 percent
Elve and similar soils: 5 percent
Mooseflat and similar soils: 5 percent

## 5013F—Tibson very cobbly loam, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,400 to 8,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tibson and similar soils**
*Composition:* 90 percent
*Geomorphic description:*
- Mountainflank on mountain
- Mountainbase on mountain

Slope*:* 35 to 60 percent
*Elevation:* 7,400 to 8,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly slope alluvium over gravelly colluvium derived from limestone, unspecified
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

### Additional Components

Worock and similar soils: 4 percent
Elve and similar soils: 3 percent
Karloff and similar soils: 3 percent

# 5014E—Loberg-Finn complex, 8 to 25 percent slopes

## Map Unit Setting

*Elevation:* 7,000 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Loberg and similar soils**
*Composition:* 60 percent
*Geomorphic description:*
- Mountainbase on mountain slope
- Mountainflank on mountain slope

Sl*ope:* 8 to 25 percent
*Elevation:* 7,000 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly clayey colluvium derived from igneous rocks
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Finn and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Drainageway
*Slope:* 8 to 25 percent
*Elevation:* 7,000 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Gravelly alluvium
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 5.7 inches

## Additional Components

Worock and similar soils: 4 percent
Elve and similar soils: 3 percent
Vitroff and similar soils: 3 percent

# 5016F—Illiano-Bendoh-Rock outcrop association, 35 to 70 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,700 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

## Component Description

**Illiano and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Nose slope summit on hill
- Head slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 70 percent
*Elevation:* 5,700 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Bendoh and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,700 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Rock outcrop, welded tuff**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

## Additional Components

Rubble land, welded tuff: 10 percent
Karloff and similar soils: 6 percent
Eremis and similar soils: 4 percent

Coslaw and similar soils: 3 percent
Worock and similar soils: 2 percent

## 5017E—Karloff-Coslaw-Illiano association, 8 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,500 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 8 to 35 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Coslaw and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

**Illiano and similar soils**
*Composition:* 20 percent

*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from tuff or unspecified gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Bendoh and similar soils: 6 percent
Rock outcrop: 4 percent
Liart and similar soils: 3 percent
Eremis and similar soils: 2 percent

## 5017F—Karloff-Coslaw-Illiano association, 35 to 70 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,500 to 7,500 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Coslaw and similar soils**
*Composition:* 30 percent

*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 35 to 60 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

**Illiano and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 70 percent
*Elevation:* 5,500 to 7,500 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Bendoh and similar soils: 5 percent
Rock outcrop: 4 percent
Liart and similar soils: 3 percent
Eremis and similar soils: 2 percent
Worock and similar soils: 1 percent

## 5019F—Illiano-Karloff-Rock outcrop complex, 35 to 70 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 6,700 to 7,700 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

## Component Description

**Illiano and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 70 percent
*Elevation:* 6,700 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Karloff and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 70 percent
*Elevation:* 6,700 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

## Additional Components

Rubble land, welded tuff: 10 percent
Coslaw and similar soils: 6 percent
Bendoh and similar soils: 4 percent
Vitroff and similar soils: 3 percent
Worock and similar soils: 2 percent

# 5021E—Karloff-Coslaw-Bendoh complex, 15 to 45 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,800 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

## Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Coslaw and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 15 to 45 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

**Bendoh and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,800 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly ashy loam

*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

### Additional Components

Rock outcrop: 3 percent
Eremis and similar soils: 2 percent

## 5023E—Worock-Elve-Libeg complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,700 to 7,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,700 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Elve and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,700 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

**Libeg and similar soils**
*Composition:* 30 percent

*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 15 to 35 percent
*Elevation:* 6,700 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Channery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Judco and similar soils: 3 percent
Redfern and similar soils: 2 percent

## 5023F—Worock-Elve-Libeg complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,200 to 7,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Elve and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly coarse sandy loam
*Depth to restrictive feature:* None noted

*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

**Libeg and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 35 to 60 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Channery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Judco and similar soils: 5 percent
Bendoh and similar soils: 3 percent
Redfern and similar soils: 2 percent

## 5023G—Worock-Elve-Libeg complex, 60 to 85 percent slopes

### Map Unit Setting

*Elevation:* 7,200 to 7,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Worock and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 85 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Elve and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 60 to 85 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

**Libeg and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 60 to 85 percent
*Elevation:* 7,200 to 7,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Channery loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.4 inches

### Additional Components

Karloff and similar soils: 5 percent
Rock outcrop: 3 percent
Redfern and similar soils: 2 percent

## 5024D—Elve-Worock-Lowland complex, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,600 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly coarse sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

**Worock and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Lowland and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Side slope on hill
- Mountainflank on mountain

*Slope:* 4 to 15 percent
*Elevation:* 6,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

### Additional Components

Karloff and similar soils: 5 percent
Bendoh and similar soils: 3 percent
Libeg and similar soils: 2 percent

## 5025E—Redfern-Copenhaver-Rock outcrop complex, 15 to 45 percent slopes

### Map Unit Setting

*Elevation:* 7,200 to 7,800 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Redfern and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 15 to 45 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Mixed residuum
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

**Copenhaver and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 45 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from quartzite, residuum weathered from andesite, or residuum weathered from basalt
*Flooding:* None
*Available water capacity:* Mainly 1.4 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 10 percent
Libeg and similar soils: 3 percent
Karloff and similar soils: 2 percent

## 5025F—Copenhaver, stony-Libeg, very stony-Rock outcrop complex, 15 to 60 percent slopes

### Map Unit Setting

*Elevation:* 7,200 to 7,800 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Copenhaver and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Backslope on hill
Sl*ope:* 15 to 45 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from andesite, residuum weathered from quartzite, or residuum weathered from basalt
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

**Libeg and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Riser on terrace

Slope*:* 25 to 60 percent
*Elevation:* 7,200 to 7,800 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very gravelly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 4.7 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

### Additional Components

Rubble land: 10 percent
Redfern and similar soils: 3 percent
Illiano and similar soils: 2 percent

## 5026E—Elve complex, very stony, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,700 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent boulders and 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Elve, very cobbly and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,400 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

### Additional Components

Worock and similar soils: 5 percent
Redfern and similar soils: 3 percent
Rock outcrop: 2 percent

## 5026F—Elve-Cowood complex, very stony, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 6,400 to 7,700 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent

*Elevation:* 6,400 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent boulders and 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Elve, very cobbly, and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Cowood and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Backslope on mountain
*Slope:* 45 to 60 percent
*Elevation:* 6,400 to 7,700 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.1 inches

## Additional Components

Redfern and similar soils: 5 percent
Rock outcrop: 3 percent
Illiano and similar soils: 2 percent

# 5027F—Cowood-Elve, very stony-Rock outcrop association, 35 to 70 percent slopes

## Map Unit Setting

*Elevation:* 6,200 to 7,800 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Cowood and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Backslope on mountain
*Slope:* 35 to 70 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very stony loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from granite over residuum weathered from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.0 inches

**Elve and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 70 percent
*Elevation:* 6,200 to 7,800 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Rock outcrop**
*Composition:* 10 percent
*Definition:* Rock outcrop consists of exposures of bare bedrock.

## Additional Components

Rubble land: 10 percent
Karloff and similar soils: 6 percent
Illiano and similar soils: 4 percent

## 5028E—Bendoh-Karloff complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bendoh and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Karloff and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

### Additional Components

Elve and similar soils: 6 percent
Worock and similar soils: 4 percent

## 5028F—Bendoh-Karloff-Rock outcrop complex, 35 to 70 percent slopes

### Map Unit Setting

*Elevation:* 6,000 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Bendoh and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 70 percent
*Elevation:* 6,000 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Karloff and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 70 percent
*Elevation:* 6,000 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rock outcrop, welded tuff**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Rubble land, welded tuff: 10 percent
Elve and similar soils: 5 percent
Worock and similar soils: 3 percent
Illiano and similar soils: 2 percent

## 5029F—Karloff-Judco-Illiano complex, 35 to 70 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 70 percent
*Elevation:* 5,400 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Judco and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Alluvial fan
- Base slope on hill
- Side slope on hill
- Mountain slope

*Slope:* 35 to 70 percent
*Elevation:* 5,400 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Illiano and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 70 percent
*Elevation:* 5,400 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Bendoh and similar soils: 5 percent
Rock outcrop: 3 percent
Coslaw and similar soils: 2 percent

## 5030F—Tepecreek-Ellena-Caseypeak complex, 35 to 60 percent slopes, very bouldery

### Map Unit Setting

*Elevation:* 6,400 to 7,000 feet
*Mean annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Tepecreek and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Side slope on hill
- Mountainflank on mountain

*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Coarse sandy loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent boulders
*Depth to restrictive feature:* Bedrock (lithic): 30 to 60 inches; Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Gravelly colluvium derived from granite or gravelly residuum weathered from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

**Ellena and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 6,400 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Coarse sandy loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent boulders
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Somewhat excessively drained
*Parent material:* Granitics
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.0 inches

**Caseypeak and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain
Sl*ope:* 35 to 60 percent
*Elevation:* 6,400 to 7,000 feet
*Effective annual precipitation:* 15 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly coarse sandy loam
*Rock fragments on the soil surface:* 0.10 to 3.00 percent boulders
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from granite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.2 inches

### Additional Components

Rock outcrop: 2 percent
Worock and similar soils: 2 percent
Rubble land: 1 percent

## 5031D—Elve, stony-Karloff-Worock complex, 4 to 15 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,200 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Karloff and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 4 to 15 percent
*Elevation:* 6,200 to 6,600 feet

*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Worock and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 6,200 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

### Additional Components

Coslaw and similar soils: 5 percent
Bendoh and similar soils: 3 percent
Illiano and similar soils: 2 percent

## 5031E—Elve, stony-Worock-Karloff complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 6,200 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Worock and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.5 inches

**Karloff and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 6,200 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

### Additional Components

Judco and similar soils: 5 percent
Bendoh and similar soils: 3 percent
Coslaw and similar soils: 2 percent

## 5031F—Elve-Worock-Karloff complex, 35 to 60 percent slopes, stony

### Map Unit Setting

*Elevation:* 5,600 to 7,000 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Elve and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly loamy colluvium
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

**Worock and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Gravelly loamy colluvium
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches

**Karloff and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 7,000 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

## Additional Components

Judco and similar soils: 3 percent
Rock outcrop: 1 percent
Rubble land: 1 percent

# 5032E—Karloff-Bendoh-Coslaw complex, 15 to 35 percent slopes

## Map Unit Setting

*Elevation:* 5,500 to 6,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

## Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Bendoh and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

**Coslaw and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,500 to 6,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained

*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

### Additional Components

Illiano and similar soils: 5 percent
Pax and similar soils: 3 percent
Worock and similar soils: 2 percent

## 5032F—Karloff-Coslaw-Bendoh complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,500 to 6,600 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,500 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.2 inches

**Coslaw and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Summit on hill
- Mountain

*Slope:* 35 to 60 percent
*Elevation:* 5,500 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium derived from rhyolite over residuum weathered from rhyolite
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 1.6 inches

**Bendoh and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 5,500 to 6,600 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Gravelly ashy loam
*Depth to restrictive feature:* Bedrock (lithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.7 inches

### Additional Components

Illiano and similar soils: 5 percent
Judco and similar soils: 2 percent
Rock outcrop: 2 percent
Rubble land: 1 percent

## 5033F—Illiano-Karloff-Rock outcrop complex, 25 to 70 percent slopes

### Map Unit Setting

*Elevation:* 5,900 to 7,200 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days

### Component Description

**Illiano and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 25 to 70 percent
*Elevation:* 5,900 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Karloff and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 25 to 70 percent
*Elevation:* 5,900 to 7,200 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 60 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Rubble land, welded tuff: 15 percent
Bendoh and similar soils: 3 percent
Coslaw and similar soils: 2 percent

## 5034E—Judco-Karloff-Rock outcrop complex, 8 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,600 to 7,100 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Judco and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Base slope on hill
- Side slope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 7,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land

*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Karloff and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,600 to 7,100 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Rock outcrop, welded tuff**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Bendoh and similar soils: 6 percent
Coslaw and similar soils: 5 percent
Rubble land, welded tuff: 5 percent
Worock and similar soils: 4 percent

## 5034F—Karloff-Judco-Rock outcrop complex, 35 to 60 percent slopes

### Map Unit Setting

*Elevation:* 5,800 to 6,900 feet
*Mean annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days

### Component Description

**Karloff and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,900 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained

*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Judco and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Base slope on hill
- Side slope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,800 to 6,900 feet
*Effective annual precipitation:* 20 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (paralithic): 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches

**Rock outcrop, welded tuff**
*Composition:* 10 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Bendoh and similar soils: 5 percent
Rubble land, welded tuff: 5 percent
Illiano and similar soils: 4 percent
Pax and similar soils: 3 percent
Worock and similar soils: 3 percent

## 5035E—Pax-Karloff-Illiano complex, 15 to 35 percent slopes

### Map Unit Setting

*Elevation:* 5,400 to 6,250 feet
*Mean annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 90 days

### Component Description

**Pax and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Nose slope on hill
- Side slope on hill
- Mountaintop on mountain

- Mountainflank on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches

**Karloff and similar soils**
*Composition:* 30 percent
*Geomorphic description:*

- Backslope on hill
- Mountain slope

*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Illiano and similar soils**
*Composition:* 15 percent
*Geomorphic description:*

- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

## Additional Components

Judco and similar soils: 5 percent
Macabre and similar soils: 5 percent

# 5035F—Pax-Karloff-Illiano complex, 35 to 60 percent slopes

## Map Unit Setting

*Elevation:* 5,400 to 6,250 feet
*Mean annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 90 days

## Component Description

**Pax and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Nose slope on hill
- Side slope on hill
- Mountaintop on mountain
- Mountainflank on mountain
- Ridge

*Slope:* 35 to 60 percent
*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches

**Karloff and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Backslope on hill
- Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 2.1 inches

**Illiano and similar soils**
*Composition:* 15 percent
*Geomorphic description:*
- Head slope summit on hill
- Nose slope summit on hill
- Mountaintop on mountain

*Slope:* 35 to 60 percent

*Elevation:* 5,400 to 6,250 feet
*Effective annual precipitation:* 18 to 30 inches
*Frost-free period:* 30 to 70 days
*Surface layer texture:* Very flaggy ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Gravelly residuum weathered from unspecified tuff or gravelly residuum weathered from rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

### Additional Components

Litag and similar soils: 5 percent
Nivean and similar soils: 3 percent
Rock outcrop: 1 percent
Rubble land: 1 percent

## 5036D—Litag-Pax-Nivean complex, 4 to 15 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,600 to 6,000 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Litag and similar soils**
*Composition:* 40 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain

*Slope:* 4 to 15 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

**Pax and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Nose slope on hill
- Side slope on hill
- Mountaintop on mountain

- Mountainflank on mountain
- Ridge

*Slope:* 4 to 15 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches

**Nivean and similar soils**
*Composition:* 20 percent
*Geomorphic description:*

- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 4 to 15 percent
*Elevation:* 5,600 to 6,000 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Flaggy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.9 inches

### Additional Components

Karloff and similar soils: 5 percent
Macabre and similar soils: 5 percent

## 5036E—Pax-Nivean-Litag complex, 15 to 35 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,300 to 6,200 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Pax and similar soils**
*Composition:* 45 percent
*Geomorphic description:*

- Nose slope on hill
- Side slope on hill
- Mountaintop on mountain
- Mountainflank on mountain
- Ridge

*Slope:* 15 to 35 percent

*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches

**Nivean and similar soils**
*Composition:* 25 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Flaggy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.9 inches

**Litag and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain

*Slope:* 15 to 35 percent
*Elevation:* 5,300 to 6,200 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

## Additional Components

Macabre and similar soils: 5 percent
Judco and similar soils: 3 percent
Rock outcrop: 1 percent
Rubble land: 1 percent

# 5036F—Pax-Nivean-Litag complex, 35 to 60 percent slopes, moderately impacted

## Map Unit Setting

*Elevation:* 5,700 to 6,400 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

## Component Description

**Pax and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Nose slope on hill
- Side slope on hill
- Mountaintop on mountain
- Mountainflank on mountain
- Ridge

*Slope:* 35 to 60 percent
*Elevation:* 5,700 to 6,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches

**Nivean and similar soils**
*Composition:* 35 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 35 to 60 percent
*Elevation:* 5,700 to 6,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Flaggy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.9 inches

**Litag and similar soils**
*Composition:* 20 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain

*Slope:* 35 to 60 percent

*Elevation:* 5,700 to 6,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy sandy clay loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches

### Additional Components

Judco and similar soils: 4 percent
Macabre and similar soils: 3 percent
Rock outcrop: 2 percent
Rubble land: 1 percent

## 5037E—Macabre-Nivean-Rock outcrop complex, 15 to 45 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 6,100 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Macabre and similar soils**
*Composition:* 45 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 45 percent
*Elevation:* 5,400 to 6,100 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy clay loam
*Depth to restrictive feature:* Bedrock (lithic): 20 to 60 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Native plant cover type:* Forest land
*Flooding:* None
*Available water capacity:* Mainly 3.1 inches

**Nivean and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Nose slope on hill
- Mountaintop on mountain
- Ridge

*Slope:* 15 to 45 percent
*Elevation:* 5,400 to 6,100 feet

*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Flaggy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 0.9 inches

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Judco and similar soils: 5 percent
Pax and similar soils: 3 percent
Litag and similar soils: 2 percent

## 5038F—Litag-Arlen-Rock outcrop complex, 25 to 60 percent slopes, moderately impacted

### Map Unit Setting

*Elevation:* 5,400 to 5,900 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### Component Description

**Litag and similar soils**
*Composition:* 30 percent
*Geomorphic description:*
- Alluvial fan
- Side slope on hill
- Mountainbase on mountain

*Slope:* 25 to 50 percent
*Elevation:* 5,400 to 5,900 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Rhyolite
*Flooding:* None
*Available water capacity:* Mainly 5.2 inches

**Arlen and similar soils**
*Composition:* 30 percent

*Geomorphic description:*
- Head slope on hill
- Nose slope on hill
- Mountaintop on mountain

*Slope:* 25 to 60 percent
*Elevation:* 5,400 to 5,900 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very cobbly ashy sandy loam
*Depth to restrictive feature:* Bedrock (lithic): 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from rhyolite or residuum weathered from tuff
*Flooding:* None
*Available water capacity:* Mainly 0.7 inches

**Rock outcrop, welded tuff**
*Composition:* 30 percent
*Definition:* This component consists mainly of exposed areas of welded tuff, rhyolitic tuff, and/or tuffaceous volcanic rocks.

### Additional Components

Macabre and similar soils: 5 percent
Nivean and similar soils: 3 percent
Pax and similar soils: 2 percent

## LDF—Landfill

### Component Description

**Landfill**
*Composition:* 100 percent
*Definition:* Areas of accumulated waste products of human habitation that can be above or below natural ground level

## M-W—Water, miscellaneous

### Component Description

**Water, miscellaneous**
*Composition:* 100 percent
*Definition:* Areas of sewage lagoons, industrial waste pits, fish hatcheries, etc.

## W—Water

### Component Description

**Water**
*Composition:* 100 percent

# Use and Management of the Soils

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

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

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

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

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

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

In this soil survey, recreational interpretations that rate the soils for potential use as camp areas, paths and trails, picnic areas, and playgrounds are not provided because of the degree that the soils have been impacted. Onsite evaluation is required to determine the suitability of the soils for recreational uses.

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

## Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited*, and *unsuited* or as *good, fair*, and *poor*.

## Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

# Agronomy

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Cropland Management

Management concerns affecting the use of the detailed soil map units in the survey area for constructing grassed waterways, vegetating grassed waterways and filter strips, and installing sprinkler irrigation are shown in the table, "Cropland Management."

A *grassed waterway* is a natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. The grassed waterway conducts surface water away from cropland.

A *filter strip* is a trench with a sand or gravel bottom used to filter water.

*Sprinkler irrigation* is a method to apply water to soils to assist in the production of crops. Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

## Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1, there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in the table, "Land Capability and Yields per Acre of Crops and Pasture." The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

## Prime Farmland and Other Important Farmland

In this section, prime farmland and other important farmland are defined. The soils in the survey area that are considered prime farmland are listed in the table, "Prime and Important Farmland," at the end of this section.

### Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable

supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from
0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in the “Prime and Important Farmland” table. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in the “Acreage and Proportionate Extent of the Soils” table. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

## Additional Farmland of Statewide Importance

Some areas other than areas of prime farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate state agency or agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states, additional farmland of statewide importance may include tracts of land that have been designated for agriculture by state law.

Farmland of statewide importance is included in the list of prime farmland. Criteria are available in the Field Office Technical Guide, Section II, which is available in local offices of the Natural Resources Conservation Service and online at http://www.nrcs.usda.gov/technical/efotg/.

# Rangeland

Glen P. Green, District Conservationist—Deer Lodge, Natural Resources Conservation Service, prepared this section.

Rangeland makes up about 52 percent of the land area in the Deer Lodge County Area. Agricultural income is derived primarily from cattle raised in cow-calf and cow-calf/yearling operations. Sheep and hog farming represent a small component of the overall livestock produced in the soil survey area.

On most operations, the forage produced on rangeland is supplemented through grazing on other land uses. These include woodlands, irrigated and dry tame pastures, hayland aftermath, and some crop stubble. In winter, livestock are fed hay that is produced on the unit or purchased locally. A 5- to 6-month winter feed period is common throughout the area.

Achieving healthy, sustainable rangelands through proper grazing management of native rangelands is an important management concern in the area. Implementation of rotational grazing systems is necessary to improve and/or maintain the kinds and amounts of native plants that make up the historic native plant communities. Similarity index is often less than 50 percent on greater than 50 percent of the rangeland acres. Similarity index represents the degree of similarity the present plant community has to the historic climax plant community. When the similarity index is less than 50 percent, that means less than 50 percent of the plants that currently occupy a particular ecological site are the same plants that would occupy that site at historic climax. Forage production on many of the ecological sites in the survey area is below the potential of what those sites are able to produce when in their historic climax condition. Much of the acreage was once dominated by tall-growing and high-producing bunchgrasses. Presently it is dominated by low-producing native grasses, introduced grasses, weeds, and brush. The amount of forage produced on these low similarity index sites can be as low as one-third of the potential annual production.

Another important concern is the invasion of noxious weeds and brush. Spotted knapweed is the most common noxious weed throughout the soil survey area. It continues to spread by a number of methods, primarily by vehicles. Additional noxious weeds that pose a resource concern include whitetop, Canada thistle, leafy spurge (in the Galen and Warm Springs areas), rubber rabbitbrush (in the northeastern part of the county), and big sagebrush and little sagebrush (in the Big Hole area).

Restoring soil chemical properties and native vegetation in the area north and east of the town of Anaconda are additional resource concerns. When the Anaconda Copper Company operated a smelter plant east of Anaconda, the smelter fallout increased soil surface acidity over the years. Native vegetation was virtually eliminated because of the changes in soil chemistry and plant nutrient availability. Those affected areas are slowly recovering, mainly with basin wildrye and redtop colonization and reproduction. However, the presence and density of noxious weeds in those areas has also increased.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil.

Effective management is based on the relationship between the soils and vegetation and water.

*Range* is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

*Grazed forestland* is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

*Naturalized pasture* is defined as forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

The table "Rangeland and Forest Understory Production and Plant Composition" at the end of this section shows, for each soil, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic native vegetation; and the average percentage of each species. Explanation of the column headings in this table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service and online at http://www.glti.nrcs.usda.gov/technical/publications/nrph.html.

*Total dry-weight production* is the amount of vegetation that can be expected to grow annually in a well-managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

*Characteristic native vegetation*—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

## Rangeland Condition

Rangeland condition is based on a comparison of the present plant community with the potential natural plant community on a particular ecological site. The more closely the existing community resembles the natural community, the better the range condition.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed. A very severe disturbance may destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weedlike plants, can invade. If the plant community has not deteriorated significantly, it eventually can return to dominantly natural plants if proper grazing management is applied.

Four range condition classes are used to show the degree of deterioration of the natural plant community. An area of rangeland is in *excellent condition* if more than 75 percent of the present plant community is the same as the natural plant community. It is in *good condition* if the natural plants make up 51 to 75 percent of the present plant community, in *fair condition* if those plants make up 26 to 50 percent, and in *poor condition* if they make up less than 25 percent.

Knowledge of the range site and condition is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, the potential for recreational uses, and the condition of watersheds.

## Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the “National Range and Pasture Handbook” (USDA, 2003).

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing use, timely deferment of grazing, and planned rotation grazing systems are key practices. The experience of ranchers and research has shown that if no more than one-half of the current year’s growth is grazed, a plant community in good or excellent condition can be maintained and one in fair condition can be improved. The remaining one-half enables plants to make and store food for regrowth and root development. As a result, the desirable plants remain healthy and are not replaced by less desirable grasses and weeds. Also, the plant cover protects the soil from water erosion and soil blowing, improves tilth, increases the rate of water infiltration, and helps to control runoff.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These practices include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding. The table, “Rangeland Improvement,” shows, for each map unit, the limitations to the range improvements of fencing and developing pond reservoir areas.

Various kinds of grazing systems can be used in range management. No single grazing system is best under all conditions. The grazing system should increase the quantity and improve the quality of the range vegetation; should meet the needs of the individual operator; and should be designed according to topography, type of grazing animals, and resource management objectives.

Special improvement practices are needed in areas where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These practices include range seeding, brush management, water spreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for range improvement. On other soils, however, only proper grazing management can improve the range. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical brush and weed control, and water spreading. Those soils in capability classes 7 and 8, however, are not suitable. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification, for seeding and as a means of increasing the rate of water infiltration for seed germination.

Where feasible, mechanical renovation practices, such as shallow chiseling, can help to speed recovery of the desired plants. These practices open up the surface and thus allow absorption of more moisture and production of more desirable plants. Mechanical renovation, brush management, and timely deferment of grazing allow recovery of desired plants.

Seeding may be needed in areas where less desirable plants are dominant. A clean, firm seedbed should be prepared, suitable species should be selected for seeding, and rest periods should be long enough to allow the new plants to become established. Special improvement practices can be effective only if the management system helps to keep the desirable plants healthy.

## Forestland Understory Management

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forestland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Forest understory production can be influenced by controlling canopy density in addition to the management of stocking rates, distribution, and season of use. Often both the forestland and range resources can be enhanced through thinning the overstory to canopy levels that optimize both timber and forage production. Broadcast seeding of disturbed areas soon after timber harvest can improve forage quantity and quality and reduce the chances of undesirable plants occupying the site.

Steepness of slopes and distance to drinking water are severe grazing management problems in much of the mountain and foothill areas. Variations in primary season of use, production levels, and plant communities because of elevation and aspect changes present additional challenges. Long, steep slopes provide limited access to livestock. Less sloping areas are subject to overuse.

Grazing should be delayed until the soil is firm enough to withstand trampling and the plants have matured enough to withstand grazing pressure.

Riparian areas should be protected from overuse by livestock. Misuse results in deterioration of protective vegetation, reduction of streambank stability, and excessive erosion. Developing off-stream-watering locations can successfully prevent cattle from overgrazing riparian areas and encourage better livestock distribution.

# Forestland

Brian Dougherty, Soil Scientist, and Tim Wiersum, Forester, Natural Resources Conservation Service, prepared this section.

## Forest Resource Statistics

Forests are among the most important natural resources of Deer Lodge County, supplying timber, grazing, clean water, wildlife habitat, recreation, and natural beauty. Soil surveys are important to apply various forest practices effectively while minimizing the impacts on soil, water, and related resources. For example, stands of trees on certain soils will respond better to thinning; some soils are susceptible to slumping and excessive erosion after road building and harvesting, and other soils will require special effort to harvest and reforest.

About 160,000 acres are forested, or nearly 56 percent of the total survey area. Forestland ownership is as follows:

| | |
|---|---|
| Private | 59% |
| Federal | 10% |
| State | 31% |

Most of the forested acreage is commercial forestland capable of growing more than 20 cubic feet per acre per year at culmination of mean annual increment of growth. Forestland above 8,000 feet elevation, dominated by whitebark pine, is generally considered noncommercial.

### Forested Areas

In the survey area, forestland ranges in elevation from 4,500 to over 8,500 feet. Mean annual precipitation varies from 10 to 40 inches. The valleys consist of grasslands with forests of black cottonwood, quaking aspen, and lodgepole pine; Douglas-fir occurs in the draws and bordering streams and rivers.

Above the valley floor, grasslands give way to forest. Mostly, variations in soils and climate cause forest stands to differ. Temperature and moisture are important climatic factors affecting forest growth and composition. Forest productivity is low on dry sites and high on moist sites. Elevation and aspect are topographic features that further influence temperature and moisture. The Douglas-fir type occupies the warm-dry end of the climatic gradient while subalpine fir occupies the cool-wet end at the highest elevations. Lodgepole pine is the most common tree species. Other common trees are whitebark pine, Engelmann spruce, and Rocky Mountain juniper.

Forest understory plant communities exhibit the same diversity. Bluebunch wheatgrass, rough and Idaho fescues, and arrowleaf balsamroot predominate on warmer, drier sites. Pinegrass, elk sedge, heartleaf arnica, common snowberry, white spiraea, twinflower, mallow ninebark, and Saskatoon serviceberry are common in more moderate environments. Pinegrass, common beargrass, grouse whortleberry, dwarf and blue huckleberry, common snowberry, and white spiraea typify the cool-moist forest types.

The vegetation and soils around Anaconda are contaminated from the former smelter emissions that contained heavy metals and sulfur compounds. This contamination affected plant and soil biotic life. Soils have eroded and are now slowly recovering.

## Parent Materials

Soils have developed from several different parent materials, including granite, limestone, quartzite, argillite, and several volcanics (basalt, andesite, rhyolite, and tuffs).

Soils derived from granitic parent materials weather into coarse-textured soils that are potentially erosive. Typical soils weathered from granite are Ambrant, Elkner, and Rochester. These soils occur throughout the area from warm-dry to cool-moist forests.

Soils derived from limestone parent materials are medium- to fine-textured soils with lime like Helmville, Relyea, Whitecow, and Whitore. Wherever lime is near the surface, such as in the Whitecow and Whitore soils, it gives Douglas-fir a distinct competitive advantage over other species on these soils. The medium-textured soils like Helmville, Whitecow, and Whitore are relatively stable and ideal for road construction. Relyea, a fine-textured soil, does have trafficability concerns. Forest productivity is rated low to moderate on the medium-textured soils and moderate on the Relyea soils.

Quartzites break down to medium- to coarse-textured soils like Elve and Evaro. These soils are stable with good trafficability and moderate productivity.

Argillite parent materials form medium-textured soils. Worock is a typical soil. These soils are similar to quartzite soils except for having slightly more clay in the subsoil. Productivity is slightly higher than on quartzite soils.

Volcanic parent materials form fine- to medium-textured soils. Typical soils are Bignell, Danaher, Loberg, Worock, and Yreka. Compaction and poor trafficability are potential limitations on the finer-textured soils such as Bignell and Danaher. These forest soils are some of the more productive in the survey area.

## Forestland Management and Productivity

### Soil Interpretations

To aid those who manage forestland in the soil survey area, soil interpretations relating to forestland use and management have been developed. Items considered for interpretation are:

1. Conservation tree/shrub suitability groups,
2. Construction limitations for haul roads/log landings,
3. Hand planting suitability,
4. Harvest equipment suitability,
5. Log landing suitability,
6. Mechanical planting suitability,
7. Mechanical site preparation (deep),
8. Mechanical site preparation (surface),
9. Potential erosion hazard (off-road/off trail),
10. Potential erosion hazard (road/trail),
11. Potential for seedling mortality,
12. Road suitability (natural surface),
13. Soil rutting hazard, and
14. Potential fire damage hazard.

Forestland management information for each forested soil is contained in the "Forestland Management" and "Forestland Productivity" tables. Definitions, ratings, and assumptions are explained in the following paragraphs

## Soil Rating and Limitations

Soil rating and limitations have been developed for *Limitations Affecting Construction of Haul Roads and Log Landings, Suitability for Log Landings, Soil Rutting Hazard, Hazard of Off-road and Off-trail Erosion, Hazard of Erosion on Roads and Trails, Suitability for Roads (Natural Surface), Suitability for Hand Planting and Mechanical Planting, Suitability for Use of Harvesting Equipment, Suitability for Mechanical Site Preparation (Surface and Deep), Potential for Damage to Soil by Fire,* and *Potential for Seedling Mortality*. The ratings and assumptions for the hazards or risks of soil loss from unsurfaced roads/trails are illustrated below.

1. Ratings assess:

    a. The force that natural precipitation events have to dislodge and move soil materials on roads, trails, and firebreaks.
    b. Activities on roads and trails that result in bare ground, compaction, and reshaping of the soil surface.
    c. Use by trucks, skidders, off-road vehicles, and other similar equipment.
    d. The impact on compacted, bare road, trail surface using the representative value for slope gradient of the soil component.

2. Ratings assume that roads and trails are generally linear, continuous, and narrow and range up to 7.5 meters in width.
3. Ratings do not assess frozen or snow-covered soil.
4. Definition of ratings:

    a. Not limited: Little or no erosion is likely.
    b. Limited: Some erosion is likely; occasional maintenance may be needed; simple erosion control measures may be needed.
    c. Very limited: Significant erosion can be expected; roads require frequent maintenance; costly erosion control measures are needed.

5. Soil rating criteria: Primary soil features considered in making this rating were slope, soil erodibility factor, and percent rock fragments.

In the "Forestland Management" tables, the values listed indicate severity of the criteria limitations, with 0.00 being not limited and 1.00 being very limited.

## Forestland Management

In the "Forestland Management" tables, the soils are rated for the erosion hazard, equipment limitation, seedling mortality, windthrow hazard, and plant competition.

Ratings of the erosion hazard indicate the risk of soil loss in well-managed forests. These ratings were made on the basis of the timber harvested by clearcutting and the slash burned. It is assumed reasonable care was used in logging; i.e. skid trails did not concentrate water, disturbance was not excessive, and some slash remained to cover the surface. Major soil features considered in making this rating include slope, soil depth, soil texture, and surface stoniness. The rating is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss.

Ratings of equipment limitation reflect the characteristics and conditions of the soil that restrict use of equipment generally needed in forest management. Equipment limitations in this survey area were related to logging operations, specifically, difficulties encountered in yarding logs and their influence on soil properties. Primary soil features considered in making this rating were slope, soil texture, soil depth, seasonal soil wetness, and stoniness. The rating is *slight* if the use of equipment is not limited to a particular kind of equipment or time of year; *moderate* if there is a short seasonal limitation or a need for some modification in the management of equipment; and *severe* if there is a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil limits tree seedling survival. Plant competition is not considered in the ratings. The ratings apply to one- or two-year-old seedlings from good stock that are properly planted during periods of average rainfall. As interpreted in this survey, the evaluation period begins at the time of planting. For natural regeneration, the evaluation period was considered to begin a year after germination. Soil features used in this rating include slope, soil depth, soil texture, aspect, and annual precipitation. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of windthrow hazard consider soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. Soils on north slopes that remain moist into the spring and those having a high basal area that limit root development were considered moderately prone to windthrow even though the soil materials provided a good anchoring medium for tree roots. On drier sites, clayey soils without rock fragments were considered in this category. Soils that have a high water table within 20 inches of the surface long enough to inhibit root development were considered severely susceptible to windthrow. The rating is *slight* if trees in wooded areas are not expected to be blown down by commonly occurring winds, *moderate* if some trees are blown down during periods of excessive soil wetness and strong winds, and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of plant competition indicate the degree to which understory plants are expected to encroach and affect the establishment of tree seedlings on different kinds of soil, when openings are made in the canopy. In making ratings for plant competition, if adequate regeneration usually occurs on a soil within 5 years, the limitation was considered slight. Features used in making this rating include slope, presence of clayey subsoils, annual precipitation, and the presence of rhizomatous plants in the forest understory. The rating is *slight* if there is little or no competition from other plants, *moderate* if plant competition is expected to hinder the development of a fully stocked stand of desirable trees, and *severe* if plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

## Forestland Productivity

Site index and yield tables can be used to develop estimates of potential growth for adapted tree species on different soils. Yield estimates in the “Forestland Productivity” table are expressed as average annual cubic feet per acre at CMAI—that point in time when the average annual yield is greatest.

Expected tree growth rate and the diversity of trees on a site are determined by a combination of elevation, aspect, soils, and climate. The ability of soils to support tree growth is dependent on variability in soil depth, fertility, texture, and available water capacity.

The “Forestland Productivity” table includes the columns *Common Trees*, *Site Index*, *Volume of Wood Fiber*, and *Trees to Manage*. The column, *Common Trees*, refers to the trees most commonly encountered on the different soils. They are selected on the basis of growth rate, quality, value, and marketability. For the more common trees, particularly those of commercial value, site index values have been determined.

*Site Index* is a value that ranks soil productivity for a specified tree species. It is determined by taking height measurements and concluding the age of selected trees within stands of a given species (Alexander, 1966). This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The specified number of years (base age) may be different for different species. The site index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in the “Forestland Productivity” table are averages based on measurements made at sites that are representative of the soil series. The higher the site index number is, the more productive the soil for that species is.

The site index base age is 100 years for Engelmann spruce, lodgepole pine, and ponderosa pine, and 50 years for Douglas-fir, grand fir, and western larch. Since different base ages are used for different species, site index values are not directly comparable from one species to another. Site index values were computed from the following references: Engelmann spruce (Alexander, 1967), lodgepole pine (Alexander, 1966), ponderosa pine (Meyer, 1938), Douglas-fir (Brickell, 1968), grand fir (Haig, 1932), and western larch (Cummings, 1937).

The *Trees to Manage* column in the “Forestland Productivity” table lists trees adapted to the site. The first listed tree species will likely be the most productive.

## Yields

The column, *Volume of Wood Fiber*, in the “Forestland Productivity” table lists the average annual yield estimates in board feet (Scribner’s log rule) per acre for selected tree species. Overstory yield estimates were determined for most species from average annual yield versus site index curves developed through adjustment of data presented in yield tables published from several different sources. Average annual yield values were computed at the culmination of mean annual increment.

“Yield of Even-aged Stands of Ponderosa Pine” (Meyer, 1938) was used for estimating the yields of Douglas-fir, ponderosa pine, and western larch. Board-foot yield estimates are based on all trees greater than 11.6 inches in diameter breast height (DBH). Total cubic foot yield estimates are based on trees 0.6 inches and more DBH inside bark, including top and stump.

Yield estimates for Engelmann spruce were based on managed stand yield tables (Edminster, 1978). The tables developed by Edminster represent an initial stand basal area of 120 square feet per acre and a 20-year thinning interval. Board-foot values in the table are based on trees 8 inches DBH and larger down to a 6-inch top. Cubic-foot volumes are based upon the whole tree, ground to top.

“Yield Tables for Managed Stands of Lodgepole Pine in Colorado and Wyoming” (Myers, 1967) was used to estimate the board foot yield of lodgepole pine. Board-foot volumes in the reference are based on Scribner’s log rule and include all trees larger than 10 inches DBH to an 8-inch top diameter inside bark. Total cubic-foot yield estimates are based on “Gross and Net Yield Tables for Lodgepole Pine” (Dahms, 1964). In this reference, total cubic-foot volume estimates (inside bark) are based on all trees with DBH inside the bark of more than 1 inch with tops and stumps included.

Soils with potential forest productivity greater than 85 cubic feet per acre per year CMAI are recognized as prime timberland (USDA Statement on Land Use Policy, Departmental Regulation 9500-3). Maintaining these lands in forest uses is encouraged because of their high productivity.

## Forest Understory

Forest understory information can be found in the “Rangeland” section of the manuscript with the use of the “Rangeland and Forest Understory Production and Plant Composition” table. The forest understory information consists of a listing of the understory plant species expected to occur beneath a forest canopy, an estimate of the associated understory production in favorable and unfavorable years, and the habitat type or ecological site description that would best describe the climax plant community.

# Wildlife Habitat

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

## Elements of Wildlife Habitat

The following paragraphs describe the elements of wildlife habitat.

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

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

Wild herbaceous plants are native or naturally established forbs and grasses, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are blackberry, blueberry, bluestem, dandelion, fescue, goldenrod, Indiangrass, lambsquarters, nightshade, ragweed, and wheatgrass.

Deciduous trees and woody understory produce bark, buds, catkins, foliage, nuts or other fruit, and twigs. Soil properties and features that affect the growth of deciduous trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of deciduous trees and woody understory are American elm, birch, boxelder, green ash, maple, oak, poplar, and willow. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are American plum, chokecherry, crabapple, hawthorn, honeysuckle, redosier dogwood, serviceberry, and silver buffaloberry.

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

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are big sagebrush, bitterbrush, mountain mahogany, and snowberry.

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

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

## Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, meadows, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to openland areas include cottontail rabbit, field sparrow, Hungarian partridge, killdeer, meadowlark, pheasant, red fox, sage grouse, and sharp-tailed grouse.

Habitat for woodland wildlife consists of areas of coniferous and/or deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to woodland areas include black bear, deer, elk, owl, porcupine, raccoon, ruffed grouse, thrush, tree squirrel, wild turkey, and woodpecker.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow-water areas. Some of the wildlife attracted to wetland areas include beaver, bittern, duck, geese, heron, kingfisher, mink, muskrat, otter, and rail.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland areas include antelope, deer, lark bunting, meadowlark, and sage grouse.

# Engineering

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

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

## Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The “Building Site Development” table shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

*Dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and

amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; available water capacity in the upper 40 inches; content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding; depth to a water table; ponding; slope; stoniness; and the amount of sand, clay, or organic matter in the surface layer. The soils in this survey area have not been rated for potential use for lawns and landscaping because of the degree that the soils have been impacted. Onsite evaluation is required to determine the suitability of the soils for use for lawns and landscaping.

## Sanitary Facilities

The “Sanitary Facilities” tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils, the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based

on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

## Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

The “Agricultural Waste Management” tables show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places, it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is 50 to 90 percent water, and solid if it is less than 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

*Application of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

*Overland flow of wastewater* is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

*Rapid infiltration of wastewater* is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

*Slow rate treatment of wastewater* is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application

rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented through either control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

## Construction Materials

The “Construction Materials” tables give information about the soils as potential sources of sand and gravel, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the “Construction Materials” tables, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of reclamation material and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material or roadfill. The lower the number, the greater the limitation.

*Reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate;

reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

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

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material. The soils in this survey area have not been rated for potential use as topsoil because of the degree that the soils have been impacted. Onsite evaluation is required to determine the suitability of the soils for use as topsoil.

## Water Management

The “Water Management” table gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

# Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

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

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

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

## Engineering Index Properties

The "Engineering Index Properties" table gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

*Depth* to the upper and lower boundaries of each layer is indicated.

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

*Classification* of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional

refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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

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

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

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

## Physical Properties

The “Physical Properties of the Soils” table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

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

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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

*Moist bulk density* is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage

and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity* refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity ($K_{sat}$). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

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

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

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

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1

are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

## Chemical Properties

The “Chemical Properties of the Soils” table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Effective cation-exchange capacity* refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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

*Calcium carbonate* equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

*Gypsum* is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in

water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*Sodium adsorption ratio* (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

## Water Features

The “Water Features” table gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redox features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

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

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

## Soil Features

The “Soil Features” table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

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

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

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

# References

Alexander, R.R., 1966. Site indexes for lodgepole pine with corrections for stand density; instructions for field use. U.S. Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Paper, RP-24.

Alexander, R.R. 1967. Site indexes for Engelmann spruce. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station Research Paper, RP-32.

American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Standard D 2487-00.

Brickell, J.E. 1968. A method for constructing site index curves from measurements of tree age and height—Its application to inland Douglas-fir. U.S. Department of Agriculture, Forest Service, Intermountain Research Station Research Paper INT-RP-47.

Cummings, L.J. 1937. Larch-Douglas-fir board foot yield tables. U.S. Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station. Applied Forestry Note 78.

Dahms, W.G. 1964. Gross and net yield tables for lodgepole pine. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR, Research Paper PNW-8.

Edminster, Carleton B., 1978. RMYLD: computation of yield tables for even-aged and two-storied stands. U.S. Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Paper RP-199.

Haig, I.T. 1932. Second-growth yield, stand and volume tables for the western white pine type. U.S. Department of Agriculture, Forest Service. Northern Rocky Mountain Forest Experiment Station Technical Bulletin 323.

Harrison, J.E., A.B. Griggs, and J.D. Wells. 1986. Geologic and structure maps of the Wallace 1° x 2° quadrangle, Montana and Idaho: Montana Bureau of Mines and Geology Montana Atlas Series 4-A, scale 1:250,000.

McCulloch, R.B. 1993. Montana mining directory - 1992. Montana Bureau of Mines and Geology Bulletin 131.

Meyer, W.H. 1938 and 1961. Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture, Technical Bulletin 630. Washington, DC.

Myers, C.A. 1967. Yield tables for managed stands of lodgepole pine in Colorado and Wyoming. U.S. Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Paper RM-RP-26.

Rowan, L.C., C.M. Trautwein, and T.L. Purdy. 1991. Maps showing the association of linear features with metallic mines and prospects in the Butte 1 degree x 2 degrees quadrangle, Montana. U.S. Geological Survey, Miscellaneous Investigations Series Map I-2050-B, scale 1:250000.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1998. Keys to soil taxonomy. 8th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

United States Department of Agriculture, Natural Resources Conservation Service. Montana Field Office Technical Guide, Section II. (http://www.nrcs.usda.gov/technical/efotg/)

United States Department of Agriculture, Natural Resources Conservation Service. National forestry handbook, title 190. (http://soils.usda.gov/technical/nfhandbook/)

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov/technical/handbook/)

United States Department of Agriculture, Natural Resources Conservation Service. 2003. National range and pasture handbook. (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html)

Weidman, R.M. 1988. The Greater Missoula Area - Guidebook for the 13th Annual Tobacco Root Geological Society Field Conference, Missoula, MT.

# Glossary

**Ablation till.** Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** (See Sodic (alkali) soil.)

**Alluvial fan.** A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

**Animal-unit-month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions**. Current soil wetness characterized by saturation, reduction, and redox features.

**Argillite.** Weakly metamorphosed mudstone or shale.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

| | |
|---|---|
| Very low | 0 to 3.75 |
| Low | 3.75 to 5.0 |
| Moderate | 5.0 to 7.5 |
| High | more than 7.5 |

**Avalanche chute.** The track or path formed by an avalanche.

**Backslope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding planes.** Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-floored plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Bouldery.** Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

**Bouldery soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management.** Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

**Channery soil material.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**Cirque.** A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clayey soil.** Silty clay, sandy clay, or clay.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Clearcut.** A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

**Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

**COLE (coefficient of linear extensibility).** (See Linear extensibility.)

**Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Commercial forest.** Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

**Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

**Conglomerate.** A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual” (Soil Survey Division Staff, 1993).

**Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

**Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

**Contour stripcropping (or contour farming).** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave (in tables).** The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Depth to rock (in tables).** Bedrock is too near the surface for the specified use.

**Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

**Drainage class (natural).** Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

*Somewhat excessively drained.*—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

*Well drained.*—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.
*Moderately well drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.
*Somewhat poorly drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.
*Poorly drained.*—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.
*Very poorly drained.*—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Drainageway.** An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

**Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Dune.** A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

**Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion (geologic).* Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion (accelerated).* Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Esker.** A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

**Even aged.** Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

**Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

**Fine textured soil.** Sandy clay, silty clay, or clay.

**Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Foothill.** A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

**Footslope.** The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

**Forb.** Any herbaceous plant not a grass or a sedge.

**Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Frost action (in tables).** Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Giant ripple mark.** The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

**Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glaciated uplands.** Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

**Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

**Grazeable forestland.** Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

**Green manure crop (agronomy).** A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Gypsum.** A mineral consisting of hydrous calcium sulfate.

**Habitat type.** An aggregation of all land areas capable of producing similar climax plant communities.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head out.** To form a flower head.

**Head slope.** A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

**Heavy metal.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well-decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impacted, moderately.** Moderately impacted soils generally have good ground coverage, but species present are mainly restricted to those tolerant of the effects of surface mining and smelting activities.

**Impacted, severely.** Severely impacted soils have substantial barren areas, and the species present are only those that can tolerate the extreme effects of surface mining and smelting activities.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net

irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

| | |
|---|---|
| Less than 0.2 | very low |
| 0.2 to 0.4 | low |
| 0.4 to 0.75 | moderately low |
| 0.75 to 1.25 | moderate |
| 1.25 to 1.75 | moderately high |
| 1.75 to 2.5 | high |
| More than 2.5 | very high |

**Interfluve.** An elevated area between two drainageways that sheds water to those drainageways.

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

**Kame terrace.** A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake plain.** A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones (in tables).** Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Lateral moraine.** A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess.** Fine-grained material, dominantly of silt-sized particles, deposited by wind.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

**Mean annual increment (MAI).** The average annual increase in volume of a tree during its entire life.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Microhigh.** An area that is 2 to 12 inches higher than the adjacent microlow.

**Microlow.** An area that is 2 to 12 inches lower than the adjacent microhigh.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Miscellaneous water.** A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine.** An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

**Mountain.** A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

**Muck.** Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Naturalized pasture.** Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Observed rooting depth.** Depth to which roots have been observed to penetrate.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

| | |
|---|---|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |

**Outwash plain.** An extensive area of glaciofluvial material that was deposited by meltwater streams.

**Overstory.** The trees in a forest that form the upper crown cover.

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile.

*Terms describing permeability are:*

| | |
|---|---|
| Very slow | less than 0.06 inch |
| Slow | 0.06 to 0.2 inch |
| Moderately slow | 0.2 to 0.6 inch |
| Moderate | 0.6 to 2.0 inches |
| Moderately rapid | 2.0 to 6.0 inches |
| Rapid | 6.0 to 20 inches |
| Very rapid | more than 20 inches |

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Piping (in tables).** Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

**Playa.** The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded.** Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potential natural community (PNC).** The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Quartzite, metamorphic.** Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

**Quartzite, sedimentary.** Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

**Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. (See Similarity index.)

**Range site.** (See Ecological site.)

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

| | |
|---|---|
| Ultra acid | less than 3.5 |
| Extremely acid | 3.5 to 4.4 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Moderately acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Slightly alkaline | 7.4 to 7.8 |
| Moderately alkaline | 7.9 to 8.4 |
| Strongly alkaline | 8.5 to 9.0 |
| Very strongly alkaline | 9.1 and higher |

**Recessional moraine.** A moraine formed during a temporary but significant halt in the retreat of a glacier.

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redox concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redox depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redox features.** Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

**Regeneration.** The new growth of a natural plant community, developing from seed.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Riser.** The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rubble land.** Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

| | |
|---|---|
| Nonsaline | 0 to 4 |
| Slightly saline | 4 to 8 |
| Moderately saline | 8 to 16 |
| Strongly saline | more than 16 |

**Salty water (in tables).** Water that is too salty for consumption by livestock.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sawlogs.** Logs of suitable size and quality for the production of lumber.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Scribner's log rule.** A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

**Sedimentary plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Sedimentary uplands.** Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

**Seepage (in tables).** The movement of water through soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shelterwood system.** A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

**Shoulder.** The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell (in tables).** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Similarity index.** A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

**Slickens.** Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slickspot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

| | |
|---|---|
| Nearly level | 0 to 2 percent |
| Gently sloping | 2 to 4 percent |
| Moderately sloping | 4 to 8 percent |
| Strongly sloping | 8 to 15 percent |
| Moderately steep | 15 to 25 percent |
| Steep | 25 to 45 percent |
| Very steep | more than 45 percent |

**Slope (in tables).** Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slow intake (in tables).** The slow movement of water into the soil.

**Slow refill (in tables).** The slow filling of ponds, resulting from restricted permeability in the soil.

**Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of $Na^{+}$ to $Ca^{++}$ + $Mg^{++}$. The degrees of sodicity and their respective ratios are:

| | |
|---|---|
| Slight | less than 13:1 |
| Moderate | 13-30:1 |
| Strong | more than 30:1 |

**Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

| | |
|---|---|
| Very coarse sand | 2.0 to 1.0 |
| Coarse sand | 1.0 to 0.5 |
| Medium sand | 0.5 to 0.25 |
| Fine sand | 0.25 to 0.10 |
| Very fine sand | 0.10 to 0.05 |
| Silt | 0.05 to 0.002 |
| Clay | less than 0.002 |

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

**Stony soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Strath terrace.** A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Tailwater.** The water directly downstream of a structure.

**Talus.** Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

**Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace (geologic).** An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Terracette.** Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles,

are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer (in tables).** A layer of otherwise suitable soil material that is too thin for the specified use.

**Till plain.** An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Tread.** The relatively flat terrace surface that was cut or built by stream or wave action.

**Tuff.** A compacted deposit that is 50 percent or more volcanic ash and dust.

**Understory.** Any plants in a forest community that grow to a height of less than 5 feet.

**Unstable fill (in tables).** Risk of caving or sloughing on banks of fill material.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley.** An elongated depressional area primarily developed by stream action.

**Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The action of uprooting and tipping over trees by the wind.

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