



United States  
Department of  
Agriculture

In cooperation with the  
Montana Agricultural  
Experiment Station

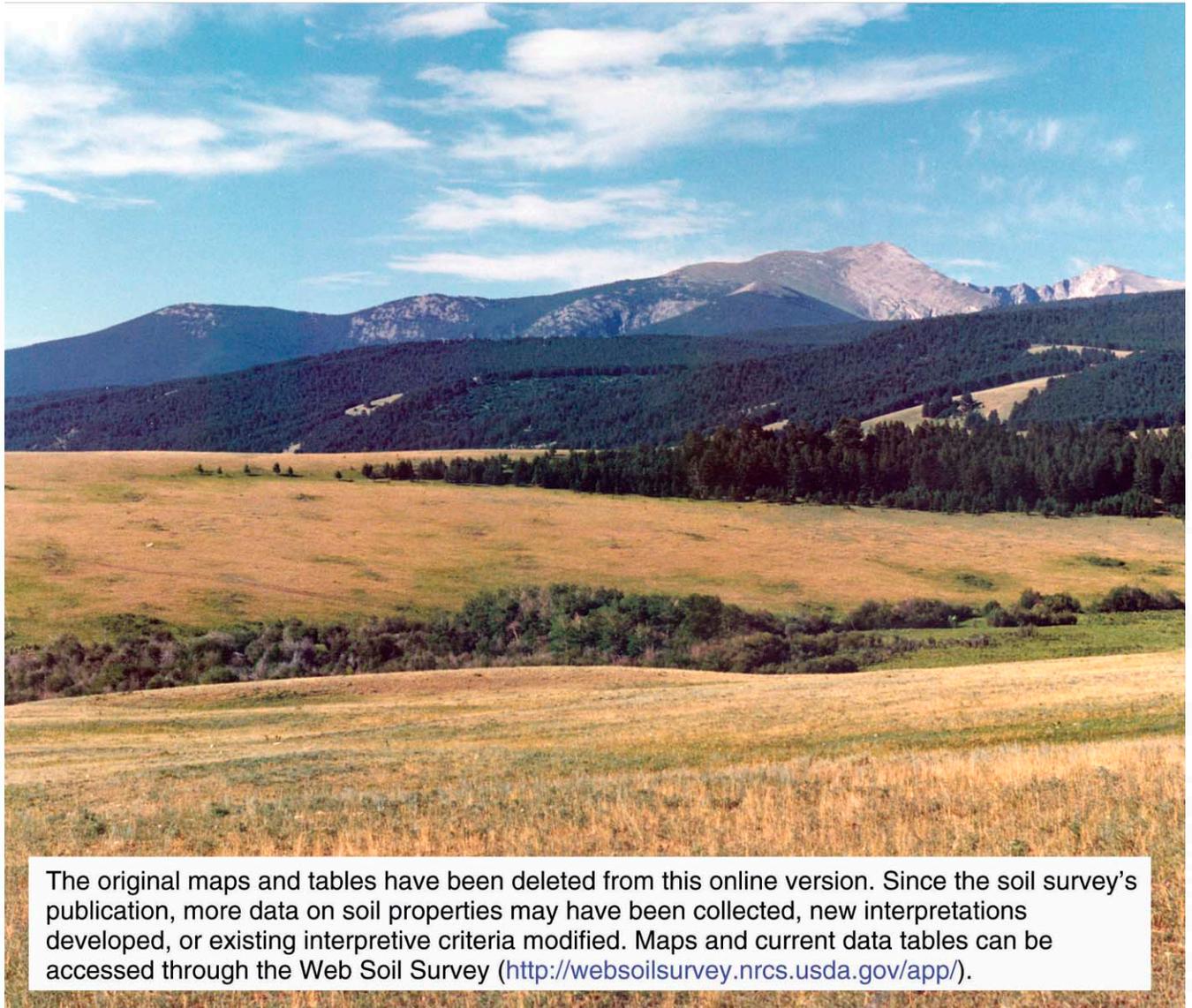
# MT644—Soil Survey of Powell County Area, Montana



Natural  
Resources  
Conservation  
Service



## Part I



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

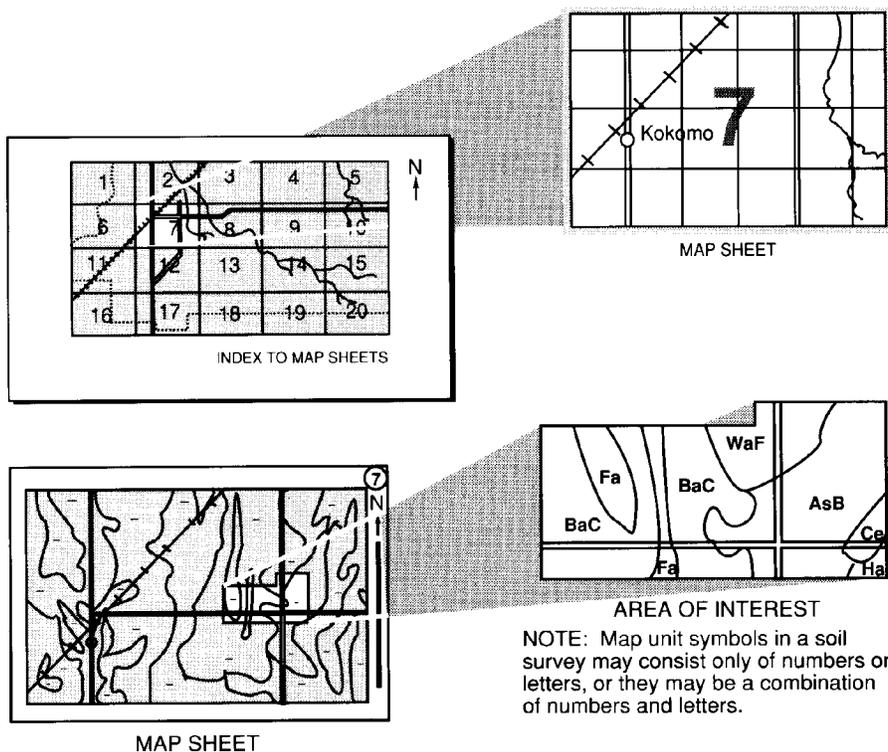
## Detailed Soil Maps

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 the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** 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.



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

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Deer Lodge Valley and North Powell Conservation Districts. Financial assistance was provided by the Old West Regional Commission in cooperation with the Montana Department of State Lands and the Montana Association of Conservation Districts, the Board of County Commissioners, and Powell County.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. 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: Deer Lodge Mountain and Mount Powell in southern Powell County Area. The lower elevation forested soils are mainly Worock gravelly loam, and the rangeland soils are mainly Roy-Shawmut-Danvers complex.**

*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

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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 Powell County Area, Montana

Fieldwork by Brian D. Dougherty, Frank Gariglio III, Arnie Irwin, Huey 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

POWELL COUNTY AREA is located in southwestern Montana (fig. 1). Powell County is bounded on the north by Flathead County, on the west by Missoula and Granite Counties, on the south by Deer Lodge and Jefferson Counties, and on the east by Lewis and Clark County. The Continental Divide runs adjacent to the eastern border of Powell County. The survey area includes 852,500 acres and covers approximately 2,337 square miles. National forest areas within Powell County were not included in this survey. Deer Lodge, the county seat, is located in the south-central part of the county.

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.

Elevation ranges from 3,500 to 8,600 feet. Mean annual precipitation ranges from 10 to 40 inches, and mean annual temperature ranges from 34 to 42 degrees F. The growing season ranges from 30 to 105 days.

## 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; industry, transportation, and recreation; physiography and drainage; geologic history and regional geology; geologic units; mineral resources; ground-water resources; seismic activity; and climate.

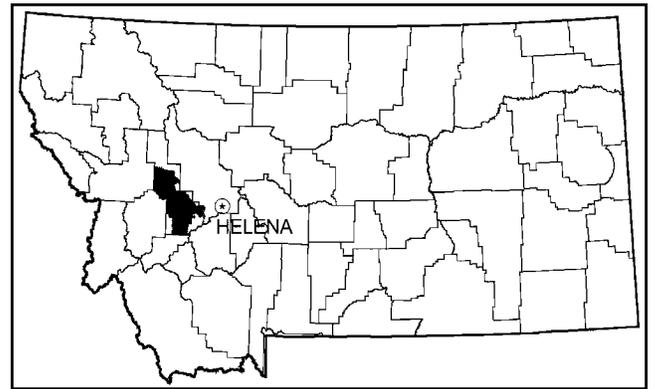


Figure 1.—Location of Powell County Area, Montana.

## History

In July 1806, Meriwether Lewis and nine members of his expedition crossed the northern part of the survey area. They became the first documented people of European descent to visit this area.

The first discovery of gold in Montana occurred in the 1850s at Gold Creek. The lure of precious metals brought a rapid influx of prospectors, miners, and fortune seekers to the survey area. Others who were willing to test the merits of additional business activities also arrived.

Shortly after World War I, the mining boom came to a halt, and many marginal mining operations shut down. Some people left the area while others remained and began ranching, developing their holdings, and establishing permanent homes.

Ranching development accompanied the growth of mining activities. At first, industry was limited to production that could be consumed locally. The Mullan Road, a military road connecting the Missouri River transportation facilities at Fort Benton, Montana, to the military outpost at Walla Walla, Washington, provided the only access to the mining towns until the establishment of the Northern Pacific Railway in 1883. In 1863, Johnny Grant started a ranch in the Deer Lodge Valley; Conrad Kohrs later owned it. The Grant-Kohrs Ranch became one of the nation's largest and best-known 19th century range ranches and is now a national historic site.

Today ranching, as well as some mining and forest industries, supports the economy of the survey area.

### **Industry, Transportation, and Recreation**

Raising livestock, growing forage crops, and producing timber are the principal industries in the survey area. Also of importance is the mining of phosphate and precious metals. Cow-calf operations account for nearly 85 percent of farm income. Barley, oats, spring wheat, and winter wheat are generally grown in rotation with forage crops. Small grains are mainly used for feed grain. Alfalfa grass-hay and certified seed potatoes are grown on irrigated land.

Public stockyards at the nearby towns of Butte and Missoula provide ranchers with good livestock marketing facilities. Some cattle are sold directly from the ranch to feeder buyers.

In the north-central part of the Powell County Area, State Highway 200 runs west and east through Ovando. East of Ovando, State Highway 141 joins State Highway 200. State Highway 141 then runs southeast near Helmville, joining U.S. Highway 12 at Avon. U.S. Highway 12 runs mainly east and west from the summit of McDonald Pass, in the northeastern corner of the survey area, to its merger with Interstate Highway 90 at Garrison. Interstate Highway 90 exits the county line just west of the Jens exit, northwest of Garrison. Interstate Highway 90 runs north and south through the town of Deer Lodge from the Jens exit on the northern end of the county to the Racetrack exit on the southern.

Numerous secondary roads exist throughout the county. A daily bus service is available to most communities. Railroads join at Garrison and run mainly parallel with Interstate Highway 90 and U.S. Highway 12 through Avon. Burlington Northern and Santa Fe, Montana Rail Link, and Montana Western are the principal railroads providing traffic through the county. Powell County airport is located just west of Deer Lodge.

The Powell County Area provides numerous opportunities for outdoor recreation. Antelope, elk, mule deer, and white-tailed deer are abundant and offer excellent big-game hunting. Camping, fishing, and water recreation activities can be found along the Blackfoot, Little Blackfoot, and Clark Fork Rivers. Numerous small lakes, ponds, and smaller streams provide good fishing.

### **Physiography and Drainage**

Mary Marshall Garsjo, State Geologist, Natural Resources Conservation Service, prepared the Geology section.

The Powell County Area is located near the center of the physiographic province of the Northern Rocky Mountains. The rugged, mountainous terrain of the Flint Creek Range to the southwest and the relatively low, rounded mountains of the Garnet Range to the east characterize the survey area. The Deer Lodge Valley separates the ranges with its broad benches sloping toward the flood plain of the Clark Fork River. In the northeastern and eastern sections of the county, the Continental Divide forms 60 miles of the border.

The Garnet Range trends west-northwest across the northern half of the survey area. The upper surface of the Garnet Range is an ancient plateau; there are only a few hundred feet of relief in the range's upper elevations. The Garnet Range contains several isolated topographic highs, including Devil Mountain with an elevation of 7,438 feet above sea level.

The Flint Creek Range is a rugged north-south trending feature located on the southwestern margin of the survey area. The Flint Creek Range is much more dissected than the Garnet Range and has a maximum relief of 4,000 feet. In the Powell County Area, the range's highest peak is Mount Powell, with an elevation of 10,300 feet.

The Lewis and Clark Range extends into the northern tip of Powell County but was not included in the survey area. Areas within the survey area that were not mapped include Beaverhead National Forestlands in the southwestern portion, Helena National Forestlands in the eastern portion, and Lewis and Clark National Forestlands in the northern portion.

The Clark Fork River, which parallels Interstate Highway 90 north through the survey area and eventually drains into the Columbia River, drains the survey area. Tributaries enter the Clark Fork drainage from the Flint Creek, Lewis and Clark, and Garnet Ranges. The Little Blackfoot River and its tributaries

drain the east-central portion of the survey area, joining the Clark Fork River at Garrison.

## Geologic History and Regional Geology

Characteristic of the Rocky Mountains, the survey area has had an extremely complex geologic history, which has been greatly simplified here. Because of the mineral deposits within the survey area, it has been mapped and studied extensively.

The geologic history of the Powell County Area began as the earth's crust cooled in the Archean Eon of the Precambrian Age. Geologists believe that the earth was formed approximately 4.5-billion years ago. In the vast amount of time that has passed since then, most of these ancient rocks have been buried and recrystallized, obscuring their original textures. Age dates on the Archean rocks of Montana show that most of them recrystallized about 2.7-billion years ago.

About 1.5-billion years ago, a very thick sequence of sediments, known as the Belt Supergroup, began to accumulate in what are now western Montana, northern Idaho, and southern British Columbia. Vegetation had not yet developed on the continents, so erosion was extensive. Vast amounts of sediment were deposited into a deep 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, deeper water environments; and limestone was normally formed in warm, shallow water.

Sediments were deposited in the Belt Basin for at least 20- to 30-million years, resulting in thousands of feet of accumulated sediments. Over time, the sediments were metamorphosed by pressure caused by the weight of the overlying materials as they accumulated. Shale was metamorphosed to argillite, siltstone to siltite, and sandstone to quartzite.

Alternating periods of deposition and erosion have occurred with changing sea levels since Precambrian time, producing a thick sedimentary sequence of interbedded sandstone, shale, and limestone. Much of Montana was above sea level for long periods. Erosion that occurred during these periods created disconformities, or gaps, in the geologic record. The survey area contains rocks from every geologic period except the Ordovician and Silurian and the upper Triassic through mid-Jurassic.

The 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, which initiated the uplift of the Rocky Mountains. This compression caused large-scale folding and faulting throughout the entire region.

Thrusting was completed by about 75-million years ago (Ruppel, 1984). Thrusting was followed by widespread episodes of plutonism and volcanism that continued throughout Cretaceous and early-Tertiary time into the Eocene. During the later stages of thrust faulting, melting within the lower crust or upper mantle created masses of magma that rose toward the surface. As the magma rose, it metamorphosed the surrounding country rock. Hydrothermal activity associated with these intrusions formed a variety of mineral deposits.

Numerous plutons were emplaced in the Powell County Area during this time, and most have a granitic composition. The largest pluton is the Boulder Batholith, which is composed of several coalesced plutons and surrounded by other isolated plutons of varying composition. [Plutons are igneous intrusions of any size. Batholiths are igneous intrusions with a surface exposure of greater than 40 square miles (100 square kilometers).] Radiometric dating has shown that the entire intrusive assemblage was emplaced over a 10-million-year time span, starting approximately 80-million years ago (Smedes and others, 1988).

Some of the magma rose and erupted on the surface, forming large fields of volcanic rocks. Magma from the melt that formed the Boulder Batholith erupted to form the Elkhorn Mountain Volcanics. The Lowland Creek Volcanics were erupted during a later volcanic episode that occurred 51- to 55-million years ago.

In mid-Tertiary time, regional tectonic forces shifted from compressional to extensional. This extensional tectonism led to the development of isolated mountain ranges surrounded by broad valleys, characteristic of the topography of southwestern Montana.

As the basins began to form, great volumes of sediment were washed into them from the surrounding mountains, forming extensive basin-fill deposits. Volcanic eruptions blanketed the survey area with volcanic ash and debris. Sediment accumulated in large basins throughout the Tertiary Period.

The climate, arid throughout most of the Tertiary Period, affected the character of the basin-fill deposits. Tropical periods during the mid-Miocene Period featured lush vegetation, which prevented widespread erosion; streams carried relatively fine-grained sediment through permanent channels. The

climate changed about 10-million years ago, and the land became a desert again. Permanent streams became ephemeral, and the character of the sediment changed. Coarser-grained sediments were laid down in flash-flood deposits that choked stream channels and spread across the landscape. These 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, alpine glaciers covered the high mountain peaks, eroding U-shaped valleys and depositing linear moraines and glacial outwash in many valleys. The Flint Creek Range has been affected by at least three known, separate glacial events. Glaciers extended into the northern tip of Powell County from the Lewis and Clark Range to the north. The Garnet Range was too low in elevation to be affected, and the remainder of the survey area is unglaciated. The last ice age ended approximately 10,000 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. Landslides occur along steep slopes composed of clayey materials, and they can occur near faults where saturated strata, regardless of rock type, have been weakened by excessive seepage. Ongoing seismic activity indicates that tectonic forces are still active in this region.

## Geologic Units

Listed in order of decreasing age, the sequence of rocks exposed in the survey area is summarized below. 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. Systems are the rocks deposited during a particular geologic period.

### Precambrian Rocks

The oldest rocks in the survey area were deposited within the Belt Supergroup, although the

entire sequence is not completely represented because of regional thrust faulting. The groups present include the Ravalli Group, the Middle Belt carbonates, and the Missoula Group. These rocks are hard and thinly bedded and consist primarily of limestone, argillite, siltite, and quartzite. They are exposed mainly in the northern part of the Garnet Range. These groups have been subdivided into separate formations. Because of their limited exposures in this survey area, they will not be discussed separately here.

### Paleozoic and Mesozoic Rocks

Paleozoic and Mesozoic sedimentary formations are exposed in the Flint Creek Range and the southern part of the Garnet Range. These formations occur as components within the folded stacks of sedimentary rocks that make up the imbricated thrust sheets characteristic of this survey area. The stratigraphic units are not continuous across broad areas.

Middle Cambrian- to Permian-aged rocks that make up the Paleozoic section consist of thick-bedded limestone and dolomite, with lesser amounts of carbonate-bearing shale and siltstone, and some sandstone and quartzite. These rocks include a Devonian-aged, highly brecciated, recrystallized limestone that is petroliferous, commonly exuding a petroleum odor. Pennsylvanian-aged sandstone, the Quadrant Quartzite, forms one of the better marker beds of the Garnet Range. Pennsylvanian-aged sandstone is a resistant, relatively pure quartzite that is fine- to medium-grained, white to tan, and vitreous; it commonly forms ridges, hogbacks, and cuestas above the underlying, less resistant shales. Also of interest is the Permian-aged Phosphoria Formation, consisting of phosphate-rich, calcareous mudstone that has been mined in the Garrison region.

Triassic- to Upper Cretaceous-aged rocks that make up the Mesozoic section are primarily sandstone and shale with lesser amounts of siltstone, thin limestone, and conglomerate.

A variety of both intrusive and extrusive rock types associated with the extensive igneous activity of the late-Cretaceous and early-Tertiary Periods occurs in the survey area. Mesozoic-aged igneous rocks consist primarily of coarse-grained granitic rocks of the Boulder Batholith. The Boulder Batholith extends to the northeast from the Big Hole River near the town of Divide and across the Boulder River almost to Helena. It occurs in the southeastern corner of the survey area.

The late-Cretaceous Elkhorn Mountain Volcanics crop out in a wide, northeast-trending band in the

southeastern corner of the survey area and in the hills to the east of the Grant-Kohrs Ranch. The volcanics consist of andesitic and basaltic air-fall tuffs, welded tuffs, breccias, and flows.

### **Cenozoic Rocks**

Cenozoic rocks in the survey area consist of both volcanic rocks and the large thickness of sediments that were deposited in the intermontane basin during Tertiary time. The most recent deposits include colluvium, alluvium, terrace gravels, and landslide debris, which are currently being deposited and reworked.

Volcanic rocks include the flows and pyroclastic deposits associated with Lowland Creek Volcanics and younger, silica rich-rhyolite flows. The Lowland Creek Volcanics extend into the extreme southeastern corner of the survey area where they overlie the Elkhorn Mountain Volcanics and granitic rocks of the Boulder Batholith. These volcanics are predominantly of volcanic breccias and mostly rhyolitic flows with interbeds of ash-flow tuffs, welded tuffs, and sedimentary strata. They are over 4,000-feet thick where fully exposed. In some areas, sedimentary units contain coal beds up to 6-inches thick.

The Lowland Creek Volcanics can be recognized by their fine-grained character and their tendency to weather to angular talus slopes. Coarser-grained granitic rock weathers to rounded, bouldery outcrops.

In the survey area, Tertiary basin-fill sediments occur in the Deer Lodge Valley, on the northeastern side of the Garnet Mountains, and in the north-central part of the survey area in the Blackfoot River Valley. Tertiary sediments are very thick in the survey area, reaching a maximum thickness of 10,300 feet in an exploratory drill hole completed in the center of the valley near Deer Lodge. Tertiary strata underlie the high terraces at the margins of the valley. A thin veneer of glacial outwash west of the Clark Fork River and alluvium near the center of the valley overlay the Tertiary strata.

Tertiary basin fill has been mapped as units of the Bozeman Group and consists of light-gray to yellowish-brown tuffaceous sandstone containing subordinate interbeds of limestone and lenses of pebble and cobble conglomerate. The sediments vary widely in both grain size and their degree of consolidation; individual units grade into and interfinger with each other. Some sediments are unconsolidated to semiconsolidated, while some are hard and completely lithified. The sediments are interbedded with 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.

The northern end of the survey area contains Pleistocene-aged alpine glacial till and outwash fan deposits derived from the Ovando and Placid Creek glaciers. These deposits extend south to an area approximately 4 miles southwest of the town of Helmville, including the Kleinschmidt Flat area. Other glacial deposits consist primarily of moraine, which is a hummocky, unsorted deposit that covers glaciated valley bottoms and extends up the adjacent slopes. Lateral moraines form along the side margins of the glacier as it advances, and terminal moraines form across the course of a glacier at the point of its furthest advance. One of the most distinctive moraines in the Flint Creek Range is the Racetrack Moraine, located at the southern end of Powell County. Other terminal moraines are located at the valley floor below Dempsey, Tincup Joe, Rock, Mill, Pike's Peak, and Gold Creeks.

Quaternary surficial deposits make up the material typically found on the valley floors of the survey area and include terrace gravels, colluvium, alluvium, and landslide deposits. These deposits are generally unconsolidated and relatively thin. Most of these deposits are originally of glacial origin and have been reworked and transported by current streams. Recent alluvium includes both coarse-grained channel deposits and fine-grained flood plain deposits. Fan deposits and cemented colluvium are near the valley margins.

### **Mineral Resources**

In 1852, Powell County Area was the site of Montana's first placer gold discovery near the mouth of Gold Creek. The placer deposit at the mouth of Bear Creek produced more than \$7,000,000 in gold and silver before 1917. The Powell County Area ranks fourth overall in the historical production of placer gold in Montana between 1904 and 1946. Lode deposits of gold, silver, copper, lead, and zinc were emplaced with the granodiorite intrusive rocks. These deposits include replacement lodes located along the contact between granodiorite and the Cambrian and Precambrian sedimentary rocks it intruded and in veins within both the intrusive bodies and the country rocks they intruded.

Commercial phosphate was mined for a number of years outside Garrison, near the Clark Fork River. These deposits were mined for use in fertilizer;

however, because of fluoride emissions the operation was eventually stopped. Phosphate is currently being mined near Warm Springs Creek.

There are no significant oil and gas prospects located in the survey area at this time. Seven exploration holes have previously been drilled in the Deer Lodge Valley. Minor lignite deposits are contained in the Tertiary sediments around the Rock Creek area, southwest of Garrison, and in the area near Spotted Dog Creek, west of Elliston.

## Ground-Water Resources

The main source of ground water in the Deer Lodge Valley is the alluvium of the Clark Fork River. Wells completed in this aquifer are generally shallow, ranging from 10- to 150-feet deep. The water is unconfined, and the water table fluctuates seasonally. Overall water quality is suitable for both domestic and livestock use. Yields range from 5 to 150 gallons per minute (gpm), with an average of about 25 gpm. Limited irrigation supplies of 200 to 300 gpm can generally be obtained locally from the upper few hundred feet, and flows to 600 gpm are possible in the Racetrack area.

Tertiary basin-fill sediments are the other primary source of water in the Deer Lodge Valley. These sediments are finer grained than the alluvium and become more consolidated with depth. Well yields are generally between 15 and 20 gpm, although the city of Deer Lodge is reported to have a 900-gpm well in this deposit. Ground water is confined under artesian conditions; however, few wells flow at the surface.

In the upper elevations of the survey area, ground water reserves are available in bedrock aquifers at far greater depths, generally 200 to over 600 feet. Formations containing limestone and sandstone are commonly the best producing aquifers.

## Seismic Activity

Powell County Area 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. The intermountain seismic belt is characterized by shallow seismicity, earthquake swarms, and normal fault scarps, which show evidence of Quaternary or historic movement. Small- to moderate-magnitude earthquakes in this seismic zone occur at depths between 3 and 10 miles below

the surface and can occur along small, discontinuous faults that do not extend to the surface.

Since 1982, The Earthquake Studies Office of the Montana Bureau of Mines and Geology has operated a network of seismographs in western Montana. The network is relatively dense around the Butte area to identify any increases in seismicity following flooding of the Berkeley Pit and the mines around it. Information provided by the Earthquake Studies Office shows that there have been hundreds of small earthquakes, with a maximum magnitude of 2.8, recorded in the Butte area since the network began in 1982. Ninety-six earthquakes, with a maximum magnitude of 3.1, were recorded in or near Deer Lodge County in this same period. Only three earthquakes had magnitudes greater than 2.5.

Microearthquakes are earthquakes with magnitudes of 2.0 or less. Microearthquakes are not commonly felt and are recorded only on local seismographs. Earthquakes with magnitudes under 4.5 do not generally cause significant damage.

Montana has been divided into earthquake hazard areas on a scale from five to ten. This designation is based on historic earthquake activity and the distribution of active faults. The survey contains areas designated as both seven and eight. For comparison, the area around Plentywood is designated as a six, and the area around Hebgen Lake is designated as a ten.

## Climate

The survey area, located along the western slopes of the Continental Divide, is quite irregular in topography. The area experiences large variations in climate within short distances, typical of mountain-valley landscapes.

Powell County Area has marked seasonal variations, typical of Montana's counties situated near or along the Continental Divide. A pronounced difference in precipitation exists between mountain and valley areas.

The valleys are relatively dry during the colder months and wetter during late spring and early summer. In the valleys, the moist season generally occurs during May, June, and July. In the mountains, the wettest part of the year is from midwinter to early spring; however, the average pattern is more complicated and, as a result, more variable. At high elevations the wettest periods are fall, winter, and spring. Precipitation during the colder half of the year is often light and steady, sometimes lasting for hours. During the warmer months, showers and thundershowers dominate precipitation events.

Winter months in the northern half of the survey area produce cloudy weather. Nearly all winter precipitation falls as snow. Winters are cold, averaging well below freezing. Summers, although warm, seldom produce oppressive heat, and even the warmest days (most commonly in the 90-degree range) are followed by cool nights.

Following this section are tables giving data on temperature and precipitation, probable dates of the first freeze in fall and the last freeze in spring, and data on length of the growing season.

*Growing-degree days*, as shown in the “Temperature and Precipitation” table, are equivalent to heat units. During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (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.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. This 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 survey 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, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate 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 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, 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 data from these analyses and tests as well as field-observed characteristics and 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 for crop yields under high levels of management are modeled and validated with farm records and field or plot information 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.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

## Temperature and Precipitation

(Recorded in the period 1961-1990 at Deer Lodge, Montana)

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have—		Average Number of Growing- Degree Days*	Average	2 years in 10 Will Have—		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
DEER LODGE:											
January-----	31.8	9.2	20.5	53	-29	2	0.49	0.15	0.77	1	11.0
February-----	37.8	14.6	26.2	58	-24	6	0.33	0.12	0.51	0	5.3
March-----	44.0	19.4	31.7	66	-12	23	0.48	0.22	0.70	1	9.1
April-----	54.7	25.7	40.2	78	8	99	0.75	0.34	1.15	2	4.9
May-----	63.0	32.9	48.0	83	16	262	1.83	1.00	2.56	5	0.4
June-----	71.8	40.1	56.0	90	26	476	1.76	0.88	2.53	5	0.2
July-----	80.6	43.2	61.9	94	30	679	1.17	0.45	1.76	3	0.0
August-----	80.2	42.0	61.1	96	29	652	1.21	0.51	1.88	4	0.0
September---	69.3	33.9	51.6	90	15	361	1.09	0.29	1.73	3	0.1
October-----	58.3	26.2	42.2	80	5	142	0.63	0.23	1.00	2	1.4
November----	42.4	18.2	30.3	65	-12	21	0.42	0.19	0.63	1	5.6
December----	32.8	10.5	21.6	55	-27	4	0.43	0.20	0.63	1	8.3
Yearly:											
Average----	55.6	26.3	40.9	—	—	—	—	—	—	—	—
Extreme----	100.0	-40.0	—	96	-35	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,728	10.59	7.86	12.42	28	46.2

\* 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 (Threshold: 40.0 degrees F).

## Freeze Dates in Spring and Fall

(Recorded in the period 1961-1990 at Deer Lodge, Montana)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
<b>DEER LODGE:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than---	June 7	July 1	July 24
2 years in 10 later than---	May 31	June 22	July 16
5 years in 10 later than---	May 17	June 7	July 2
First freezing temperature in fall: August-December			
1 year in 10 earlier than--	Sept. 3	Aug. 26	Aug. 11
2 years in 10 earlier than-	Sept. 9	Aug. 31	Aug. 16
5 years in 10 earlier than-	Sept. 20	Sept. 8	Aug. 27

## Growing Season

(Recorded in the period 1961-1990 at Deer Lodge, Montana)

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<i>Days</i>	<i>Days</i>	<i>Days</i>
DEER LODGE:			
9 years in 10-----	95	66	30
8 years in 10-----	106	75	39
5 years in 10-----	126	94	57
2 years in 10-----	146	113	74
1 year in 10-----	157	123	84



# Formation and Classification of the Soils

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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, "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," at the end of this section show the classification and extent of the soils in this survey area.

## Formation of the Soils

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 as they relate to the soils in the Powell County Area.

## Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. In the Powell County Area, winters are cold; springs are cool and moist; and summers are warm and dry. Seasonal weather patterns include arctic cold waves and gusty warm southwest winds, called Chinooks. 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.

Precipitation and temperature affect the kind and amount of vegetation that grows on the soil. Vegetation decays 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.

In the survey area, the mean annual precipitation ranges from 11 to 40 inches. The mean annual temperature ranges from 34 to 44 degrees F.

## 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, and changes in porosity and structure.

Roots, rodents, and insects penetrate the soil and alter its structure. Microorganisms, chemicals in the soil, and insects change leaves, roots, and entire plants that remain in the surface layer to humus. Fungi and algae also contribute to the decomposition of bedrock. Animals increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Common rodents in the survey area are badger, ground squirrel, and rabbit.

Vegetation in this survey area consists mainly of short grasses, mid grasses, and shrubs in the valleys and coniferous forests in the mountains.

## 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. On the terrace edges of this survey area, runoff water has carved drainages. These rugged areas contrast sharply with the smoother areas of the terrace surfaces.

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. Nearly level to moderately sloping soils have the characteristics of soils common in the

survey area. Examples of this general principle are the Sixbeacon soil that is moderately steep or very steep and the Coben soil that is nearly level to strongly sloping.

## Parent Material

Most of the soils in the survey area formed in alluvium derived from mixed sources or from material weathered from bedrock. Types of this bedrock include andesite, argillite, basalt, granite, limestone, quartzite, rhyolite, and sandstone.

Soils, such as the Elve and the Libeg series, that formed in argillites and quartzites are generally loamy. Soils, such as the Danaher and the Loberg series, that formed in materials weathered from igneous rocks are generally clayey. Soils, such as the Ambrant and the Comad series, that formed in materials weathered from granite are generally sandy. Soils, such as the Helmville and the Relyea series, that formed from limestone are clayey or loamy. Soils, such as the Con and the Danvers series, that formed in mixed alluvium are either clayey or loamy.

Many soils in the survey area have accumulated lime from the parent material. Lime affects the availability of plant nutrients, especially phosphorus.

## 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. Canarway gravelly sandy loam, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a stream. The soil contains organic matter that forms an A horizon; it has little clay accumulation and little translocation of carbonates within the profile.

The Coben soil formed in parent material that is similar to that of the Canarway gravelly sandy loam but is much older. These soils formed in alluvium on alluvial fans and stream terraces. They contain enough organic matter to have a dark-colored A horizon and a distinct clay accumulation in a Bt horizon. Nearly all of the carbonates have been leached to a depth of about 23 inches.

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, "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 Inceptisol, from *inceptum*, meaning beginning.

**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 Ustept (*Ust*, meaning burnt, plus *ept*, from Inceptisol).

**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 Haplustepts (*Hapl*, meaning simple, plus *ustepts*, the suborder of the Inceptisols that have an ustic moisture regime).

**SUBGROUP.** Each great group has a typical subgroup. Other subgroups are intergrades or extragrades. The typical 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 Haplustepts.

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 Haplustepts.

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 Doney series. The Doney series is a fine-loamy, mixed, superactive, frigid Typic Haplustept.

## Soil Series and Detailed Soil Map Units

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In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil 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, 1962). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

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 and gives the principal hazards and limitations to be considered in planning for specific uses.

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, Bignell gravelly loam, 8 to 15 percent slopes, is one of several phases of the Bignell 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. Braziel-Tolbert complex, 8 to 15 percent slopes, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Rubble land is an example.

The "Acreage and Proportionate Extent of the Soils" table in Parts I and II of the manuscript 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."

### **Ambrant Series**

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderately rapid to 2C, rapid below

*Landform:* Mountains

*Parent material:* Granitic colluvium

*Slope range:* 4 to 60 percent

*Elevation range:* 4,500 to 5,500 feet

*Annual precipitation:* 18 to 25 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

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

#### **Typical Pedon**

Ambrant gravelly sandy loam, in an area of Ambrant-Rochester complex, 35 to 60 percent slopes, in an area of woodland, 1,700 feet north and 1,600 feet east of the southwest corner of sec. 29, T. 11 N., R. 7 W.

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

E1—0 to 7 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; many very fine and common fine pores; 5 percent cobbles and 15 percent pebbles; moderately acid; clear wavy boundary.

E and Bt1—7 to 18 inches; E part (70 percent) is pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 5/3) moist; B part (30 percent) is brown (10YR 5/3) sandy loam lamellae,  $\frac{1}{4}$ - to  $\frac{3}{8}$ -inch thick, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; many very fine and common fine pores; 5 percent cobbles and 20 percent pebbles; moderately acid; clear wavy boundary.

E and Bt2—18 to 32 inches; about 80 percent is pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 5/3) moist (E part); about 20 percent is brown (10YR 5/3) gravelly sandy loam lamellae,  $\frac{1}{4}$ - to  $\frac{3}{8}$ -inch thick, dark brown (10YR 4/3) moist (B part); weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; many very fine and common fine pores; 10 percent cobbles and 25 percent pebbles; slightly acid; clear wavy boundary.

2C—32 to 60 inches; light yellowish brown (10YR 6/4) very cobbly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; hard, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and common fine pores; 5 percent stones, 15 percent cobbles, and 25 percent pebbles; moderately acid.

#### **Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

*Depth to the 2C horizon:* 28 to 46 inches

*E1 horizon*

Value: 5 to 7 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 boulders, stones, and cobbles; 15 to 30 percent angular pebbles

Reaction: pH 5.6 to 7.3

*E and Bt horizons*

Hue: E part—10YR or 2.5Y; B part—10YR or 2.5Y  
 Value: E part—6 or 7 dry, 4 to 6 moist; B part—4 or 5 dry, 3 or 4 moist  
 Chroma: E part—2 or 3; B part—2 or 3  
 Clay content, mixed: 5 to 18 percent; lamellae have less than 3 percent clay increase  
 Texture: Sandy loam or coarse sandy loam  
 Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 10 to 35 percent angular pebbles  
 Reaction: pH 5.6 to 7.3

*2C horizon*

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 or 5 moist  
 Chroma: 1 to 4  
 Texture: Coarse sandy loam, coarse sand, loamy coarse sand, sand, or loamy sand  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 15 to 60 percent—10 to 25 percent stones and cobbles; 10 to 45 percent angular pebbles  
 Reaction: pH 5.6 to 7.3

**79D—Ambrant-Rochester complex, cool, 4 to 15 percent slopes****Setting***Landform:*

- Ambrant—Mountains
- Rochester—Mountains

*Slope:*

- Ambrant—4 to 15 percent
- Rochester—4 to 15 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Ambrant and similar soils: 50 percent  
 Rochester and similar soils: 35 percent

**Minor Components**

Soils that have loamy sand or sand throughout: 0 to 5 percent  
 Soils that have loam throughout: 0 to 5 percent  
 Areas of rock outcrop: 0 to 5 percent

**Major Component Description****Ambrant**

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

**Rochester**

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**79E—Ambrant-Rochester complex, cool, 15 to 35 percent slopes****Setting***Landform:*

- Ambrant—Mountains
- Rochester—Mountains

*Slope:*

- Ambrant—15 to 35 percent
- Rochester—15 to 35 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Ambrant and similar soils: 50 percent  
 Rochester and similar soils: 35 percent

**Minor Components**

Soils that have loamy sand or sand throughout: 0 to 5 percent  
 Soils that have loam throughout: 0 to 5 percent  
 Areas of rock outcrop: 0 to 5 percent

### Major Component Description

#### Ambrant

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

#### Rochester

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 79F—Ambrant-Rochester complex, cool, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Ambrant—Mountains
- Rochester—Mountains

##### *Slope:*

- Ambrant—35 to 60 percent
- Rochester—35 to 60 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Ambrant and similar soils: 50 percent

Rochester and similar soils: 35 percent

#### Minor Components

Soils that have loamy sand or sand throughout: 0 to 5 percent

Soils that have loam throughout: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

#### Ambrant

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

#### Rochester

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 179E—Ambrant-Rochester complex, 15 to 35 percent slopes

#### Setting

##### *Landform:*

- Ambrant—Mountains
- Rochester—Mountains

##### *Slope:*

- Ambrant—15 to 35 percent
- Rochester—15 to 35 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Ambrant and similar soils: 50 percent

Rochester and similar soils: 35 percent

#### Minor Components

Soils that have a clayey subsoil: 0 to 10 percent

Soils that are sandy below 10 inches: 0 to 5 percent

### Major Component Description

#### Ambrant

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

#### Rochester

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 179F—Ambrant-Rochester complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Ambrant—Mountains
- Rochester—Mountains

##### *Slope:*

- Ambrant—35 to 60 percent
- Rochester—35 to 60 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Ambrant and similar soils: 50 percent

Rochester and similar soils: 35 percent

#### Minor Components

Soils that have a clayey subsoil: 0 to 10 percent

Soils that are sandy below 10 inches: 0 to 5 percent

### Major Component Description

#### Ambrant

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.8 inches

#### Rochester

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 279E—Ambrant, cool-Rochester, cool-Rock outcrop complex, 15 to 35 percent slopes

#### Setting

##### *Landform:*

- Ambrant—Mountains
- Rochester—Mountains
- Rock outcrop—Mountains

##### *Slope:*

- Ambrant—15 to 35 percent
- Rochester—15 to 35 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Ambrant and similar soils: 35 percent

Rochester and similar soils: 30 percent

Rock outcrop: 20 percent

**Minor Components**

Soils that have bedrock at depths less than 60 inches: 0 to 5 percent  
 Areas of rubble land: 0 to 5 percent  
 Soils that have slopes more than 35 percent: 0 to 5 percent

**Major Component Description****Ambrant**

*Surface layer texture:* Bouldery coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

**Rochester**

*Surface layer texture:* Very bouldery coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**279F—Ambrant, cool-Rochester,  
 cool-Rock outcrop complex,  
 35 to 60 percent slopes**

**Setting***Landform:*

- Ambrant—Mountains
- Rochester—Mountains
- Rock outcrop—Mountains

*Slope:*

- Ambrant—35 to 60 percent
- Rochester—35 to 60 percent

*Elevation:* 4,500 to 5,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Ambrant and similar soils: 35 percent  
 Rochester and similar soils: 30 percent  
 Rock outcrop: 20 percent

**Minor Components**

Soils that have bedrock at depths of less than 60 inches: 0 to 5 percent  
 Areas of rubble land: 0 to 5 percent  
 Soils that have slopes more than 60 percent: 0 to 5 percent

**Major Component Description****Ambrant**

*Surface layer texture:* Bouldery coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

**Rochester**

*Surface layer texture:* Very bouldery coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**379E—Ambrant-Rochester-Rock outcrop  
 complex, 15 to 35 percent slopes**

**Setting***Landform:*

- Ambrant—Mountains
- Rochester—Mountains
- Rock outcrop—Mountains

*Slope:*

- Ambrant—15 to 35 percent
- Rochester—15 to 35 percent

*Elevation:* 4,500 to 5,500 feet*Mean annual precipitation:* 18 to 25 inches*Frost-free period:* 70 to 90 days**Composition****Major Components**

Ambrant and similar soils: 35 percent

Rochester and similar soils: 30 percent

Rock outcrop: 20 percent

**Minor Components**

Soils that have a clayey subsoil: 0 to 8 percent

Soils that are sandy below 10 inches: 0 to 7 percent

**Major Component Description****Ambrant***Surface layer texture:* Bouldery coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat excessively drained*Dominant parent material:* Colluvium*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 3.5 inches**Rochester***Surface layer texture:* Very bouldery coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Excessively drained*Dominant parent material:* Granitic colluvium*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 2.3 inches**Rock outcrop***Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**379F—Ambrant-Rochester-Rock outcrop complex, 35 to 60 percent slopes****Setting***Landform:*

- Ambrant—Mountains
- Rochester—Mountains
- Rock outcrop—Mountains

*Slope:*

- Ambrant—35 to 60 percent
- Rochester—35 to 60 percent

*Elevation:* 4,500 to 5,500 feet*Mean annual precipitation:* 18 to 25 inches*Frost-free period:* 70 to 90 days**Composition****Major Components**

Ambrant and similar soils: 35 percent

Rochester and similar soils: 30 percent

Rock outcrop: 20 percent

**Minor Components**

Soils that have a clayey subsoil: 0 to 8 percent

Soils that are sandy below 10 inches: 0 to 7 percent

**Major Component Description****Ambrant***Surface layer texture:* Bouldery coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat excessively drained*Dominant parent material:* Colluvium*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 3.5 inches**Rochester***Surface layer texture:* Very bouldery coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Excessively drained*Dominant parent material:* Granitic colluvium*Native plant cover type:* Forestland*Flooding:* None*Available water capacity:* Mainly 2.3 inches**Rock outcrop***Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Anaconda Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans

*Parent material:* Calcareous alluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 4,000 to 5,000 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 90 to 105 days

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

### Typical Pedon

Anaconda loam, 0 to 4 percent slopes, in an area of cropland, 500 feet north and 600 feet west of the southeast corner of sec. 19, T. 7 N., R. 9 W.

Ap—0 to 8 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium platy structure parting to moderate fine granular structure; loose, very friable, nonsticky, nonplastic; common fine and coarse roots; neutral; clear smooth boundary.

Bw—8 to 14 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common fine and coarse roots; many fine irregular pores; 10 percent pebbles; neutral; clear wavy boundary.

Bk1—14 to 27 inches; white (10YR 8/2) gravelly loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; few fine roots; many fine irregular pores; 15 percent pebbles; continuous distinct lime coatings and casts on surface of pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—27 to 60 inches; very pale brown (10YR 8/3) sandy loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; soft,

friable, nonsticky, nonplastic; few fine roots; many fine irregular pores; 10 percent pebbles; continuous distinct lime coatings and casts on surface of pebbles; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; dry in all parts less than five-tenths and dry in some part more than six-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 9 inches

*Depth to the calcic horizon:* 10 to 16 inches

*Soil phases:* Heavy metals

#### Ap horizon

Chroma: 1 to 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 5.6 to 7.3 (pH 5.6 to 6.5—heavy metal phase)

#### Bw horizon

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 3 or 4

Texture: Loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bk1 horizon

Value: 7 or 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture: Loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Value: 5 to 8 dry; 4 or 6 moist

Chroma: 3 or 4

Texture: Sandy loam or loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

### 35B—Anaconda loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Anaconda and similar soils: 85 percent

##### Minor Components

Anaconda very gravelly loam: 0 to 10 percent  
 Somewhat poorly drained soils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Aquents

*Depth class:* Very deep  
*Drainage class:* Poorly drained  
*Permeability:* Moderate, moderately slow, or rapid  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 3,600 to 5,200 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 90 to 105 days

#### Representative Pedon

Aquents, in an area of pasture, 1,100 feet north of the southeast corner of sec. 29, T. 9 N., R. 9 W.

- A—0 to 5 inches; dark gray (10YR 4/1) loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; soft, friable, slightly sticky, slightly plastic; strongly effervescent; moderately alkaline; clear irregular boundary.
- C1—5 to 16 inches; light brownish gray (5Y 6/2) loam, dark grayish brown (5Y 4/2) moist; few fine prominent brownish yellow (10YR 6/8) redox concentrations; moderate medium subangular blocky structure; soft, friable, moderately sticky, slightly plastic; strongly effervescent; moderately alkaline; gradual irregular boundary.
- C2—16 to 30 inches; light brownish gray (5Y 6/2) loam, dark grayish brown (5Y 4/2) moist; common fine and coarse prominent brownish yellow (10YR 6/8) redox concentrations; moderate very coarse prismatic structure parting to weak coarse subangular blocky; soft, friable, slightly sticky, slightly plastic; moderately alkaline; clear wavy boundary.
- C3—30 to 60 inches; very pale brown (10YR 7/3) very gravelly coarse sand, light yellowish brown (10YR 6/4) moist; single grain; loose, very friable, nonsticky, nonplastic; 45 percent pebbles; slightly alkaline.

#### Range in Characteristics

*Clay content:* 5 to 50 percent  
*Rock fragments in the control section:* 0 to 70 percent  
*Depth to the seasonal high water table:* 12 to 24 inches

### 4—Aquents-Slickens complex, 0 to 2 percent slopes, occasionally flooded

#### Setting

*Landform:*

- Aquents—Flood plains
- Slickens—Flood plains

*Slope:* 0 to 2 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Aquents and similar soils: 55 percent  
 Slickens: 30 percent

##### Minor Components

Very poorly drained soils: 0 to 7 percent  
 Areas of riverwash: 0 to 5 percent  
 Areas of open water: 0 to 3 percent

## Major Component Description

### Aquents

*Surface layer texture:* Loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

### Slickens

*Definition:* Material from ore mills, commonly freshly ground rock that has undergone chemical treatment during the milling process

*Flooding:* Occasional

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Baggs Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees

*Frost-free period:* 70 to 90 days

*Elevation range:* 3,800 to 5,000 feet

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

## Typical Pedon

Baggs sandy loam, cool, 0 to 4 percent slopes, in an area of woodland, 4,800 feet north and 2,700 feet east of the southwest corner of sec. 7, T. 15 N., R. 13 W.

O—1.5 inches to 0; partially decomposed organic matter.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine and fine interstitial pores; neutral; clear smooth boundary.

A2—4 to 10 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine and fine interstitial pores; neutral; clear smooth boundary.

Bw—10 to 21 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; neutral; gradual wavy boundary.

BC—21 to 43 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky; soft, very friable, nonsticky, nonplastic; common fine roots; many very fine interstitial pores; 5 percent pebbles; moderately alkaline; gradual wavy boundary.

C—43 to 60 inches; brown (7.5YR 5/4) loamy sand, dark brown (7.5YR 4/4) moist; single-grained; loose, nonsticky, nonplastic; few fine roots; common very fine interstitial pores; 10 percent pebbles; slightly alkaline.

## Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 16 inches

### A horizons

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 7.3

### Bw horizon

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

### BC horizon

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

### C horizon

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loamy sand

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.9

### **135B—Baggs sandy loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Baggs and similar soils: 85 percent

##### **Minor Components**

Soils that are somewhat poorly drained: 0 to 8 percent

Soils that have a loamy fine sand substratum: 0 to 7 percent

#### **Major Component Description**

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **135C—Baggs sandy loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans

*Slope:* 4 to 8 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Baggs and similar soils: 85 percent

##### **Minor Components**

Somewhat poorly drained soils: 0 to 4 percent

Poorly drained soils: 0 to 4 percent

Soils that are loamy below 10 inches: 0 to 4 percent

Soils that have a loamy fine sand substratum: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **135D—Baggs sandy loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Baggs and similar soils: 85 percent

##### **Minor Components**

Soils that have a loamy fine sand substratum: 0 to 15 percent

#### **Major Component Description**

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 479B—Baggs sandy loam, cool, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Baggs and similar soils: 85 percent

#### Minor Components

Quigley soils: 0 to 4 percent  
 Soils that are sandy below 10 inches: 0 to 4 percent  
 Somewhat poorly drained soils: 0 to 4 percent  
 Soils that have a dark surface: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Beaverell Series

*Depth class:* Very deep  
*Drainage class:* Well drained

*Permeability:* Moderate to the 2Bk1 horizon, rapid below

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Elevation range:* 3,600 to 5,200 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 90 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.

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 structure; soft, friable, nonsticky, nonplastic; many very fine and fine roots; common very fine discontinuous vesicular pores; 10 percent cobbles and 15 percent pebbles; slightly acid; clear wavy boundary.

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

Bt2—12 to 16 inches; yellowish brown (10YR 5/6) very gravelly 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 pores; common faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; 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; 20 percent cobbles and 40 percent pebbles; disseminated lime; continuous distinct lime casts surrounding 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 and 45 percent pebbles; disseminated lime; continuous distinct lime casts surrounding coarse fragments; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; dry in all parts 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

Clay content: 10 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles

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 pebbles

Reaction: pH 6.6 to 7.8

#### Bt2 horizon

Hue: 7.5YR, 10YR, 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 pebbles

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 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 pebbles  
Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.4 to 8.4

#### 2Bk2 horizon

Hue: 5YR, 10YR, 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 pebbles

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

## 132B—Beaverell cobbly loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Beaverell and similar soils: 85 percent

#### Minor Components

Somewhat poorly drained soils: 0 to 15 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 132C—Beaverell cobbly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Beaverell and similar soils: 85 percent

##### Minor Components

Anaconda soils: 0 to 15 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 332B—Beaverell loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Beaverell and similar soils: 85 percent

##### Minor Components

Very gravelly sandy soils: 0 to 5 percent  
Somewhat poorly drained soils: 0 to 4 percent

Soils that have a cobbly loam surface: 0 to 3 percent  
Soils that have slopes more than 4 percent: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Bignell Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Slow  
*Landform:* Mountains, moraines, and hills  
*Parent material:* Colluvium derived from fine-grained extrusive igneous rocks and till  
*Slope range:* 8 to 60 percent  
*Elevation range:* 4,000 to 6,500 feet  
*Annual precipitation:* 18 to 30 inches  
*Annual air temperature:* 38 to 42 degrees F  
*Frost-free period:* 70 to 90 days

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

#### Typical Pedon

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

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

E—0 to 13 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; many very fine and fine and common medium roots; common very fine and fine pores; 5 percent cobbles and

20 percent pebbles; moderately acid; clear wavy boundary.

E/Bt—13 to 17 inches; about 75 percent pinkish gray (7.5YR 6/2) very gravelly clay loam, brown (7.5YR 5/2) moist (E part); 25 percent brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist (B part); common distinct clay films on faces of peds; moderate medium subangular blocky structure parting to weak fine subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; many very fine and fine and common medium roots; common very fine and fine pores; 5 percent cobbles and 40 percent pebbles; slightly acid; clear wavy boundary.

Bt1—17 to 25 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; common very fine and few fine roots; few very fine and fine pores; common distinct clay films on faces of peds; 15 percent cobbles and 40 percent pebbles; slightly acid; clear wavy boundary.

Bt2—25 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 pores; common distinct clay films on faces of peds; 15 percent cobbles and 45 percent pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 42 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

#### *E horizon*

Hue: 7.5YR or 10YR

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam or clay loam

Clay content: 10 to 35 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles

Reaction: pH 5.1 to 6.0

#### *E/Bt horizon*

Hue: E part—7.5YR or 10YR; B part—7.5YR or 10YR

Value: E part—6 or 7 dry, 5 or 6 moist; B part—5 to 7 dry

Chroma: E part—2 or 3; B part—2, 4, or 6

Texture: Loam, sandy clay loam, or clay loam

Content of rock fragments: 25 to 60 percent—0 to 25 percent cobbles; 15 to 55 percent pebbles

Reaction: pH 5.1 to 6.5

#### *Bt horizons*

Hue: 5YR, 7.5YR, or 10YR

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 2 to 4 or 6

Texture: Clay, sandy clay, or clay loam

Clay content: 35 to 60 percent

Content of rock fragments: 35 to 60 percent—0 to 30 percent cobbles; 15 to 45 percent pebbles

Reaction: pH 5.1 to 6.5

## 99D—Bignell gravelly clay loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 85 percent

#### Minor Components

Crow soils: 0 to 5 percent

Yreka soils: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Soils that are shallow: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### **99E—Bignell gravelly clay loam, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Hills

*Slope:* 15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Bignell and similar soils: 85 percent

##### **Minor Components**

Crow soils: 0 to 4 percent

Yreka soils: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Soils that are shallow: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **99F—Bignell gravelly clay loam, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Hills

*Slope:* 35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Bignell and similar soils: 85 percent

##### **Minor Components**

Crow soils: 0 to 5 percent

Yreka soils: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Soils that are shallow: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **199E—Bignell gravelly clay loam, cool, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Hills

*Slope:* 15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Bignell and similar soils: 85 percent

##### **Minor Components**

Yreka soils: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that are gravelly loam throughout: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 199F—Bignell gravelly clay loam, cool, 35 to 60 percent slopes

### Setting

*Landform:* Hills

*Slope:* 35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 85 percent

#### Minor Components

Yreka soils: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 299E—Bignell-Yreka complex, 15 to 35 percent slopes

### Setting

*Landform:*

• Bignell—Hills

• Yreka—Hills

*Slope:*

• Bignell—15 to 35 percent

• Yreka—15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 50 percent

Yreka and similar soils: 35 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent

Trapps soils: 0 to 4 percent

Soils that have slopes more than 35 percent: 0 to 4 percent

Poorly drained soils: 0 to 3 percent

### Major Component Description

#### Bignell

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

#### Yreka

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 299F—Bignell-Yreka complex, 35 to 60 percent slopes

### Setting

*Landform:*

• Bignell—Hills

• Yreka—Hills

*Slope:*

- Bignell—35 to 60 percent
- Yreka—35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 50 percent  
Yreka and similar soils: 35 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent  
Trapps soils: 0 to 4 percent  
Soils that have slopes more than 35 percent: 0 to 4 percent  
Poorly drained soils: 0 to 3 percent

### Major Component Description

#### Bignell

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### Yreka

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 399E—Bignell-Yreka complex, cool, 15 to 35 percent slopes

### Setting

*Landform:*

- Bignell—Hills
- Yreka—Hills

*Slope:*

- Bignell—15 to 35 percent
- Yreka—15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 50 percent  
Yreka and similar soils: 35 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent  
Soils that are moderately deep: 0 to 4 percent  
Poorly drained soils: 0 to 4 percent  
Soils that have a gravelly clay subsoil: 0 to 3 percent

### Major Component Description

#### Bignell

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### Yreka

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 399F—Bignell-Yreka complex, cool, 35 to 60 percent slopes

### Setting

*Landform:*

- Bignell—Hills
- Yreka—Hills

*Slope:*

- Bignell—35 to 60 percent
- Yreka—35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Bignell and similar soils: 50 percent

Yreka and similar soils: 35 percent

**Minor Components**

Areas of rock outcrop: 0 to 4 percent

Soils that are moderately deep: 0 to 4 percent

Poorly drained soils: 0 to 4 percent

Soils that have a gravelly clay subsoil: 0 to 3 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Yreka**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**499D—Bignell, cool-Yreka complex,  
8 to 15 percent slopes****Setting***Landform:*

- Bignell—Hills
- Yreka—Hills

*Slope:*

- Bignell—8 to 15 percent
- Yreka—8 to 15 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Bignell and similar soils: 50 percent

Yreka and similar soils: 35 percent

**Minor Components**

Soils that are less than 60-inches deep: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Crow soils: 0 to 5 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Yreka**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**499E—Bignell, cool-Yreka complex,  
15 to 35 percent slopes****Setting***Landform:*

- Bignell—Hills
- Yreka—Hills

*Slope:*

- Bignell—15 to 35 percent
- Yreka—15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Bignell and similar soils: 50 percent  
Yreka and similar soils: 35 percent

**Minor Components**

Soils that are less than 60-inches deep: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Crow soils: 0 to 5 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Yreka**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**499F—Bignell, cool-Yreka complex,  
35 to 60 percent slopes****Setting***Landform:*

- Bignell—Hills
- Yreka—Hills

*Slope:*

- Bignell—35 to 60 percent
- Yreka—35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Bignell and similar soils: 50 percent  
Yreka and similar soils: 35 percent

**Minor Components**

Soils that are less than 60-inches deep: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Crow soils: 0 to 5 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Yreka**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**699D—Bignell gravelly loam,  
8 to 15 percent slopes****Setting***Landform:* Hills

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 85 percent

#### Minor Components

Crow soils: 0 to 4 percent  
 Yreka soils: 0 to 3 percent  
 Winkler soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 699E—Bignell gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 85 percent

#### Minor Components

Crow soils: 0 to 4 percent  
 Yreka soils: 0 to 3 percent  
 Winkler soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 699F—Bignell gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 35 to 60 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bignell and similar soils: 85 percent

#### Minor Components

Crow soils: 0 to 4 percent  
 Yreka soils: 0 to 3 percent  
 Winkler soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 799D—Bignell-Yreka-Crow complex, 8 to 15 percent slopes

#### Setting

*Landform:*

- Bignell—Hills
- Yreka—Hills
- Crow—Hills

*Slope:*

- Bignell—8 to 15 percent
- Yreka—8 to 15 percent
- Crow—8 to 15 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Bignell and similar soils: 55 percent

Yreka and similar soils: 15 percent

Crow and similar soils: 15 percent

##### Minor Components

Areas of rock outcrop: 0 to 5 percent

Soils that are shallow to bedrock: 0 to 5 percent

Soils that have slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

##### Bignell

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

##### Yreka

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

##### Crow

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 799E—Bignell-Yreka-Crow complex, 15 to 35 percent slopes

#### Setting

*Landform:*

- Bignell—Hills
- Yreka—Hills
- Crow—Hills

*Slope:*

- Bignell—15 to 35 percent
- Yreka—15 to 35 percent
- Crow—15 to 35 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Bignell and similar soils: 55 percent

Yreka and similar soils: 15 percent

Crow and similar soils: 15 percent

##### Minor Components

Areas of rock outcrop: 0 to 5 percent

Soils that are shallow to bedrock: 0 to 5 percent

Soils that have slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

##### Bignell

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

### **Yreka**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

### **Crow**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **999D—Bignell-Rumblecreek complex, 8 to 15 percent slopes**

### **Setting**

*Landform:*

- Bignell—Hills
- Rumblecreek—Hills

*Slope:*

- Bignell—8 to 15 percent
- Rumblecreek—8 to 15 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Bignell and similar soils: 50 percent  
 Rumblecreek and similar soils: 35 percent

#### **Minor Components**

Crow soils: 0 to 5 percent

Winfall soils: 0 to 5 percent  
 Soils that have slopes more than 15 percent: 0 to 5 percent

### **Major Component Description**

#### **Bignell**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### **Rumblecreek**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **999E—Bignell-Rumblecreek complex, 15 to 35 percent slopes**

### **Setting**

*Landform:*

- Bignell—Hills
- Rumblecreek—Hills

*Slope:*

- Bignell—15 to 35 percent
- Rumblecreek—15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Bignell and similar soils: 50 percent  
 Rumblecreek and similar soils: 35 percent

**Minor Components**

Crow soils: 0 to 5 percent  
 Winfall soils: 0 to 5 percent  
 Soils that have slopes more than 35 percent: 0 to 5 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

**Rumblecreek**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**999F—Bignell-Rumblecreek complex, 35 to 60 percent slopes****Setting***Landform:*

- Bignell—Hills
- Rumblecreek—Hills

*Slope:*

- Bignell—35 to 60 percent
- Rumblecreek—35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 26 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Bignell and similar soils: 50 percent  
 Rumblecreek and similar soils: 35 percent

**Minor Components**

Crow soils: 0 to 5 percent  
 Winfall soils: 0 to 5 percent  
 Soils that have slopes more than 60 percent: 0 to 5 percent

**Major Component Description****Bignell**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

**Rumblecreek**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Blossberg Series**

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderately slow to the 2C, rapid below

*Landform:* Flood plains and low stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 3,800 to 6,000 feet

*Annual precipitation:* 10 to 19 inches

*Annual air temperature:* 39 to 44 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.

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 and 20 percent pebbles; 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 and 20 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 to 12 inches

*Depth to the seasonal high water table:* 12 to 24 inches

*Depth to the 2Cg horizon:* 20 to 40 inches

*Thickness of the mollic epipedon:* 10 to 24 inches

#### A horizon

Value: 2 or 3 moist; 3 to 5 dry

Redox concentrations: 10YR 4/4 or 10YR 4/6 moist; 10YR 5/6 or 10YR 5/8 dry

Clay content: 18 to 27 percent clay

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bg1 horizon

Hue: 5Y, 2.5Y, or 10YR

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 2 or 3

Redox concentrations: 10YR 4/4 or 10YR 4/6 moist; 10YR 5/6 or 10YR 5/8 dry

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 pebbles

Reaction: pH 7.4 to 8.4

#### Bg2 horizon

Hue: 5Y, 2.5Y, or 10YR

Value: 4 or 5 moist; 5 or 6 dry

Chroma: 1 or 2

Redox concentrations: 2.5YR 4/6 or 2.5YR 4/8 moist; 2.5YR 5/6 or 2.5YR 5/8 dry

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 pebbles

Reaction: pH 7.4 to 8.4

#### 2Cg horizon

Value: 4 or 5 moist; 6 or 7 dry

Chroma: 2 or 3

Redox concentrations: 2.5YR 4/6 or 2.5YR 4/8 moist; 2.5YR 5/6 or 2.5YR 5/8 dry

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; 10 to 25 percent pebbles

Reaction: pH 7.4 to 8.4

## 634—Blossberg loam, 0 to 4 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Blossberg and similar soils: 85 percent

**Minor Components**

Very poorly drained soils: 0 to 5 percent

Bushong soils: 0 to 5 percent

Tetonview soils: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**834—Blossberg loam, 0 to 4 percent slopes, rarely flooded****Setting**

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition****Major Components**

Blossberg and similar soils: 85 percent

**Minor Components**

Dougcliff soils: 0 to 3 percent

Soils that are very gravelly below 8 inches: 0 to 3 percent

Turrah soils: 0 to 3 percent

Very poorly drained soils: 0 to 3 percent

Gregson soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Bohnlly Series**

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Landform:* Low stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,600 to 4,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine-silty, mixed, superactive, frigid Typic Endoaquolls

**Typical Pedon**

Bohnlly silt loam, 0 to 2 percent slopes, in an area of pasture, 1,320 feet north and 2,200 feet east of the southwest corner of sec. 3, T. 7 N., R. 9 W.

Oe—4 to 0 inches; partially decomposed peat.

A—0 to 12 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; soft, friable, moderately sticky, slightly plastic; many fine and medium roots; many irregular pores; 5 percent pebbles; moderately alkaline; gradual wavy boundary.

Bw—12 to 18 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; few fine faint yellowish brown (10YR 5/6) redox concentrations; weak fine subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, moderately sticky, slightly plastic; many fine and medium roots; common irregular pores; 5 percent pebbles; moderately alkaline; gradual wavy boundary.

Cg1—18 to 27 inches; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (2.5Y 6/2) dry; few fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly

sticky, slightly plastic; common fine and medium roots; common irregular pores; 5 percent pebbles; moderately alkaline; gradual wavy boundary.

**Cg2**—27 to 32 inches; dark grayish brown (2.5Y 4/2) silt loam, grayish brown (2.5Y 5/2) dry; common fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; common irregular pores; 5 percent pebbles; moderately alkaline; gradual wavy boundary.

**Cg3**—32 to 41 inches; gray (5Y 5/1) silty clay loam, gray (5Y 6/1) dry; common fine prominent yellowish brown (10YR 5/6) redox concentrations; weak coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; common irregular pores; 5 percent pebbles; moderately alkaline; clear smooth boundary.

**Cg4**—41 to 60 inches; gray (5Y 5/1) silty clay loam, gray (5Y 6/1) dry; common fine prominent yellowish brown (10YR 5/6) redox concentrations; weak coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; few fine roots; common irregular pores; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 12 inches

*Depth to the seasonal high water table:* 6 to 24 inches

#### *A horizon*

Value: 2 or 3 moist; 3 to 5 dry  
 Chroma: 1 or 2  
 Clay content: 18 to 27 percent  
 Reaction: pH 6.6 to 7.8

#### *Bw horizon*

Hue: 10YR or 2.5Y  
 Value: 2 to 5 moist; 3 to 6 dry  
 Chroma: 1 or 2  
 Clay content: 18 to 27 percent  
 Reaction: pH 6.6 to 7.8

#### *Cg1 and Cg2 horizons*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 2 to 4 moist; 5 to 7 dry  
 Chroma: 1 or 2  
 Redox features: 7.5YR 5/6, 7.5YR 4/6, 10YR 5/6, 10YR 5/1, or 10YR 4/1  
 Texture: Silt loam or silty clay loam

Clay content: 18 to 32 percent

Reaction: pH 6.6 to 7.8

#### *Cg3 and Cg4 horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 moist; 6 or 7 dry

Redox features: 7.5YR 5/6, 7.5YR 4/6, 10YR 5/6, 10YR 5/1, or 10YR 4/1

Clay content: 18 to 32 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

## 109—Bohnlly silt loam, 0 to 2 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 3,600 to 4,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Bohnlly and similar soils: 85 percent

#### Minor Components

Dougcliff soils: 0 to 8 percent

Poronto soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Silt loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 11.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Boxwell Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Sedimentary plains and hills

*Parent material:* Material derived from semiconsolidated sedimentary beds

*Slope range:* 0 to 35 percent

*Elevation range:* 4,000 to 5,200 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 90 to 105 days

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

### Typical Pedon

Boxwell loam, in an area of Dolus-Boxwell complex, 15 to 35 percent slopes, in an area of rangeland, 2,100 feet north and 2,150 feet west of the southeast corner of sec. 28, T. 9 N., R. 9 W.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; many fine irregular pores; 5 percent sandstone channers; neutral; clear smooth boundary.

Bw—3 to 11 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common fine irregular and tubular pores; 5 percent sandstone channers; neutral; clear wavy boundary.

Bk1—11 to 25 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine roots; common very fine and fine tubular pores; 5 percent sandstone channers; few fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—25 to 36 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine roots; many fine tubular pores; 10 percent sandstone channers; few fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr—36 to 60 inches; semiconsolidated sedimentary beds.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; dry in all parts less than five-tenths and dry in some part more than six-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher

*Depth to the Bk horizon:* 8 to 16 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Clay content: 15 to 27 percent

Reaction: pH 6.1 to 7.3

#### Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Silt loam, clay loam, loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles or channers

Reaction: pH 6.6 to 7.8

#### Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 6 to 8 dry; 4, 5 to 7 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, silty loam, loam, or very fine sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent pebbles or channers

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

#### Cr horizon

Semiconsolidated sedimentary beds

## 69C—Boxwell loam, 4 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 4 to 8 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Boxwell and similar soils: 85 percent

#### Minor Components

Soils that have a clayey subsoil: 0 to 10 percent  
Areas of rock outcrop: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 69D—Boxwell loam, 8 to 15 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Boxwell and similar soils: 85 percent

#### Minor Components

Soils that have a clayey subsoil: 0 to 10 percent  
Areas of rock outcrop: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 69E—Boxwell loam, 15 to 35 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Boxwell and similar soils: 85 percent

#### Minor Components

Soils that are shallow to sandstone: 0 to 15 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Braziel Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Mountains and moraines  
*Parent material:* Alpine till and material derived from fine-grained extrusive igneous rock  
*Slope range:* 4 to 60 percent  
*Elevation range:* 3,800 to 5,000 feet

*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Brazil gravelly loam, 15 to 35 percent slopes, in an area of pasture, 1,200 feet south and 1,450 feet east of the northwest corner of sec. 21, T. 7 N., R. 10 W.

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; many very fine and fine and few medium roots; many very fine and fine pores; 10 percent cobbles and 20 percent pebbles; 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; many very fine and fine and few medium roots; many very fine and fine pores; 10 percent cobbles and 20 percent pebbles; 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; many very fine and fine and few medium roots; many very fine and fine pores; few faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; 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 pores; common faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; 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 and 40 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F  
*Moisture control section:* Between depths of 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: 18 to 27 percent  
 Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles  
 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  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 5 to 60 percent—0 to 15 percent stones; 0 to 10 percent cobbles; 5 to 25 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### Bt1 horizon

Value: 4 or 5 dry; 3 moist  
 Chroma: 2 or 3 dry; 2 or 3 moist  
 Texture: Sandy clay loam, clay loam, or loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 30 to 45 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### Bt2 horizon

Value: 4 to 6 dry; 3 or 4 moist  
 Chroma: 3 or 4 dry; 2 to 4 moist  
 Texture: Clay loam, sandy clay loam, or loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 35 to 75 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 30 to 40 percent pebbles  
 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: Sandy loam, sandy clay loam, loam, or clay loam  
 Clay content: 15 to 30 percent  
 Content of rock fragments: 35 to 70 percent—0 to 15 percent stones; 5 to 35 percent cobbles; 25 to 40 percent pebbles

Effervescence: None to slightly  
Reaction: pH 6.6 to 7.8

### **200E—Braziel-Tolbert-Rock outcrop complex, 15 to 35 percent slopes**

#### **Setting**

*Landform:*

- Braziel—Mountains
- Tolbert—Mountains
- Rock outcrop—Mountains

*Slope:*

- Braziel—15 to 35 percent
- Tolbert—15 to 35 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Braziel and similar soils: 40 percent

Tolbert and similar soils: 30 percent

Rock outcrop: 15 percent

##### **Minor Components**

Soils that are moderately deep: 0 to 8 percent

Soils that have slopes more than 35 percent: 0 to 7 percent

#### **Major Component Description**

##### **Braziel**

*Surface layer texture:* Stony loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

##### **Tolbert**

*Surface layer texture:* Very stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

##### **Rock outcrop**

*Definition:* Areas of exposed bedrock

*Available water capacity:* Mainly 0.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **200F—Braziel-Tolbert-Rock outcrop complex, 35 to 60 percent slopes**

#### **Setting**

*Landform:*

- Braziel—Mountains
- Tolbert—Mountains
- Rock outcrop—Mountains

*Slope:*

- Braziel—35 to 60 percent
- Tolbert—35 to 50 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Braziel and similar soils: 40 percent

Tolbert and similar soils: 30 percent

Rock outcrop: 15 percent

##### **Minor Components**

Soils that are moderately deep: 0 to 7 percent

Soils that have slopes more than 60 percent: 0 to 8 percent

#### **Major Component Description**

##### **Braziel**

*Surface layer texture:* Stony loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

##### **Tolbert**

*Surface layer texture:* Very stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242C—Braziel-Perma gravelly loams,  
4 to 8 percent slopes****Setting**

*Landform:*

- Braziel—Mountains
- Perma—Mountains

*Slope:*

- Braziel—4 to 8 percent
- Perma—4 to 8 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Braziel and similar soils: 45 percent

Perma and similar soils: 40 percent

**Minor Components**

Soils that are moderately deep: 0 to 8 percent

Shawmut soils: 0 to 7 percent

**Major Component Description****Braziel**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Perma**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242D—Braziel gravelly loam,  
8 to 15 percent slopes****Setting**

*Landform:* Mountains

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Braziel and similar soils: 85 percent

**Minor Components**

Soils that are moderately deep: 0 to 8 percent

Shawmut soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242E—Braziel gravelly loam,  
15 to 35 percent slopes****Setting**

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Braziel and similar soils: 85 percent

#### Minor Components

Soils that are moderately deep: 0 to 8 percent  
 Shawmut soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 342D—Braziel stony loam, 8 to 15 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Braziel and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent  
 Soils that are moderately deep: 0 to 5 percent  
 Roy soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 342E—Braziel stony loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Braziel and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent  
 Soils that are moderately deep: 0 to 5 percent  
 Roy soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 342F—Braziel stony loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Braziel and similar soils: 85 percent

##### Minor Components

Areas of rock outcrop: 0 to 5 percent  
 Soils that are moderately deep: 0 to 5 percent  
 Roy soils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 442D—Braziel-Tolbert complex, 8 to 15 percent slopes

#### Setting

*Landform:*

- Braziel—Mountains
- Tolbert—Mountains

*Slope:*

- Braziel—8 to 15 percent
- Tolbert—8 to 15 percent

*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Braziel and similar soils: 60 percent  
 Tolbert and similar soils: 25 percent

##### Minor Components

Areas of rock outcrop: 0 to 3 percent  
 Soils that are moderately deep: 0 to 3 percent  
 Perma soils: 0 to 3 percent  
 Roy soils: 0 to 3 percent  
 Soils that have slopes more than 15 percent: 0 to 3 percent

#### Major Component Description

##### Braziel

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

##### Tolbert

*Surface layer texture:* Very stony loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 442E—Braziel-Tolbert complex, 15 to 35 percent slopes

#### Setting

*Landform:*

- Braziel—Mountains
- Tolbert—Mountains

*Slope:*

- Braziel—15 to 35 percent
- Tolbert—15 to 35 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Braziel and similar soils: 60 percent

Tolbert and similar soils: 25 percent

#### Minor Components

Areas of rock outcrop: 0 to 3 percent

Soils that are moderately deep: 0 to 3 percent

Soils that have a cobbly loam surface: 0 to 3 percent

Roy soils: 0 to 3 percent

Soils that have slopes more than 15 percent: 0 to 3 percent

### Major Component Description

#### Braziel

*Surface layer texture:* Stony loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

#### Tolbert

*Surface layer texture:* Very stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 442F—Braziel-Tolbert complex, 35 to 60 percent slopes

### Setting

*Landform:*

- Braziel—Mountains
- Tolbert—Mountains

*Slope:*

- Braziel—35 to 60 percent
- Tolbert—35 to 60 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Braziel and similar soils: 60 percent

Tolbert and similar soils: 25 percent

#### Minor Components

Areas of rock outcrop: 0 to 3 percent

Soils that are moderately deep: 0 to 3 percent

Soils that have a cobbly loam surface: 0 to 3 percent

Roy soils: 0 to 3 percent

Soils that have slopes more than 60 percent: 0 to 3 percent

### Major Component Description

#### Braziel

*Surface layer texture:* Stony loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

#### Tolbert

*Surface layer texture:* Very stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 742E—Braziel-Perma-Water complex, 8 to 25 percent slopes

### Setting

*Landform:*

- Braziel—Moraines
- Perma—Moraines

*Slope:*

- Braziel—8 to 25 percent
- Perma—8 to 25 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Braziel and similar soils: 50 percent

Perma and similar soils: 20 percent

Water: 15 percent

**Minor Components**

Straw soils: 0 to 5 percent

Martinsdale soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

**Major Component Description****Braziel**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

**Perma**

*Surface layer texture:* Very cobbly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Glacial outwash

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

**Water**

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**742F—Braziel-Perma-Water complex,  
25 to 50 percent slopes****Setting***Landform:*

- Braziel—Moraines
- Perma—Moraines

*Slope:*

- Braziel—25 to 50 percent
- Perma—25 to 50 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Braziel and similar soils: 50 percent

Perma and similar soils: 20 percent

Water: 15 percent

**Minor Components**

Straw soils: 0 to 5 percent

Martinsdale soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

**Major Component Description****Braziel**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

**Perma**

*Surface layer texture:* Very cobbly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Glacial outwash

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

**Water**

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### ***Bushong Series***

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Rapid

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 3,600 to 7,200 feet

*Annual precipitation:* 10 to 22 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 30 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, 100 feet north and 500 feet east of the southwest corner of sec. 6, T. 6 N., R. 9 W.

Oi—1.5 inches to 0; partially decomposed organic matter.

A—0 to 2 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; many very fine and fine and common medium roots; common very fine and fine discontinuous irregular pores; 5 percent pebbles; moderately alkaline; clear smooth boundary.

Bw—2 to 4 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; many very fine and fine and common medium roots; common very fine and fine discontinuous irregular pores; 5 percent pebbles; moderately alkaline; clear smooth boundary.

Bk—4 to 15 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; many fine distinct brown (7.5YR 4/4) redox concentrations; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly

plastic; many very fine and fine and common medium roots; common very fine and fine discontinuous irregular pores; 10 percent cobbles and 20 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—15 to 60 inches; pale brown (10YR 6/3) extremely gravelly sand, brown (10YR 5/3) moist; many medium distinct brown (10YR 4/4) redox concentrations; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine discontinuous irregular pores; 25 percent cobbles and 50 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the seasonal high water table:* 12 to 24 inches

*Depth to the Bk horizon:* 3 to 8 inches

*Other features:* The Bushong soil is a taxadjunct to the series in map unit 10 based on having a cryic temperature regime and similar use and management. It classifies as fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous Typic Cryaquents.

#### *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 pebbles

Electrical conductivity: 0 to 2 mmhos/cm

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 pebbles

Electrical conductivity: 0 to 2 mmhos/cm

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: Sandy loam or loam  
 Clay content: 15 to 27 percent  
 Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles  
 Electrical conductivity: 0 to 2 mmhos/cm  
 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  
 Texture: Sand or loamy sand  
 Clay content: 2 to 6 percent  
 Content of rock fragments: 40 to 80 percent—10 to 25 percent cobbles; 30 to 55 percent pebbles  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 6.6 to 7.8

**10—Bushong loam, taxadjunct,  
0 to 4 percent slopes**

**Setting**

*Landform:* Flood plains  
*Slope:* 0 to 4 percent  
*Elevation:* 5,400 to 7,200 feet  
*Mean annual precipitation:* 15 to 22 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Bushong and similar soils: 85 percent

**Minor Components**

Somewhat poorly drained soils: 0 to 10 percent  
 Areas of open water: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Peat  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Occasional  
*Water table:* Apparent  
*Available water capacity:* Mainly 11.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**632—Bushong loam,  
0 to 4 percent slopes**

**Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Bushong and similar soils: 85 percent

**Minor Components**

Soils that have a very gravelly sandy texture: 0 to 8 percent  
 Blossberg soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**832—Bushong loam, 0 to 4 percent  
slopes, rarely flooded**

**Setting**

*Landform:* Flood plains  
*Slope:* 0 to 4 percent  
*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Bushong and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly below 8 inches: 0 to 4 percent

Soils that have a clayey surface: 0 to 4 percent

Very poorly drained soils: 0 to 4 percent

Carten soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Canarway Series

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

*Drainage class:* Poorly drained

*Permeability:* Very rapid

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,000 to 4,100 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Aeric Fluvaquents

### Typical Pedon

Canarway gravelly sandy loam, in an area of McCabe-Canarway complex, 0 to 2 percent slopes, occasionally flooded, in an area of pasture, 1,100 feet north and 1,900 feet east of the southwest corner of sec. 14, T. 10 N., R. 12 W.

A—0 to 4 inches; very dark gray (10YR 3/1) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; common very fine and fine tubular pores; 20 percent pebbles; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 8 inches; dark grayish brown (10YR 4/2) gravelly coarse sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and medium roots; common very fine tubular pores; 20 percent pebbles; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—8 to 10 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine tubular pores; 20 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

2C3—10 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sand, grayish brown (10YR 5/2) dry; many fine faint yellowish brown (10YR 5/6) redox concentrations; single grain; loose, nonsticky, nonplastic; few fine roots; 20 percent cobbles and 35 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 12 and 35 inches

*Depth to the seasonal high water table:* 12 to 24 inches

#### A horizon

Value: 2 or 3 moist; 3 to 5 dry

Chroma: 1 to 3

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 8.4

#### C1 horizon

Value: 4 or 5 moist; 5 or 6 dry

Chroma: 2 or 3

Texture: Loamy sand or coarse sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent  
Reaction: pH 6.6 to 8.4

*C2 horizon*

Value: 4 or 5 moist; 5 or 6 dry  
Chroma: 2 or 3  
Texture: Sandy loam or sand  
Clay content: 0 to 15 percent  
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles  
Calcium carbonate equivalent: 0 to 5 percent  
Reaction: pH 7.4 to 7.8

*2C3 horizon*

Value: 4 or 5 moist; 5 or 6 dry  
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 25 percent cobbles; 25 to 35 percent pebbles  
Reaction: pH 6.6 to 7.8

**Carten Series**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow to the 2C horizon, rapid below

*Landform:* Outwash plains and flood plains

*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 44 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 pasture, 1,000 feet south and 1,500 feet east of the northwest corner of sec. 2, T. 7 N., R. 10 W.

A—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; common very fine and fine random irregular pores; 5 percent cobbles and 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bw—7 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium granular structure; soft, very friable, slightly sticky, moderately plastic; many very fine and fine roots; common very fine and fine random irregular pores; 5 percent cobbles and 5 percent pebbles; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—11 to 17 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and common fine roots; common very fine and fine and few medium constricted random irregular pores; 5 percent cobbles and 15 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual smooth boundary.

2C1—17 to 27 inches; brown (10YR 5/3) very gravelly loamy sand, brown (10YR 4/3) moist; few fine faint strong brown (7.5YR 4/6) redox concentrations; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine and common medium discontinuous irregular pores; 15 percent cobbles and 35 percent pebbles; strongly effervescent; slightly alkaline; gradual wavy boundary.

2C2—27 to 60 inches; brown (10YR 5/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; few fine faint strong brown (7.5YR 4/6) redox concentrations; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine and medium discontinuous irregular pores; 20 percent cobbles and 50 percent pebbles; slightly alkaline.

**Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*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:* 9 to 13 inches

*Depth to the 2C horizon:* 12 to 20 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 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

*Bw horizon*

Value: 4 to 6 dry; 3 to 5 moist  
 Chroma: 3 or 4  
 Texture: Loam or clay loam  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent pebbles  
 Reaction: pH 7.4 to 8.4

*Bk horizon*

Value: 4 to 8 dry; 3 to 7 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 10 percent cobbles; 15 to 25 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

*2C horizons*

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 pebbles  
 Reaction: pH 7.4 to 8.4

### 110—Carten-Wetsand complex, 0 to 2 percent slopes, rarely flooded

#### Setting

*Landform:*

- Carten—Flood plains
- Wetsand—Flood plains

*Slope:*

- Carten—0 to 2 percent
- Wetsand—0 to 2 percent

*Elevation:* 4,200 to 6,000 feet

*Mean annual precipitation:* 10 to 19 inches

*Frost-free period:* 70 to 105 days

#### Composition

##### Major Components

Carten and similar soils: 45 percent  
 Wetsand and similar soils: 40 percent

##### Minor Components

Areas of open water: 0 to 6 percent  
 Areas of riverwash: 0 to 5 percent  
 Soils that are not flooded: 0 to 4 percent

### Major Component Description

#### Carten

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.4 inches

#### Wetsand

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 432—Carten loam, 0 to 4 percent slopes, rarely flooded

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Carten and similar soils: 85 percent

##### Minor Components

Soils that are very gravelly below 10 inches: 0 to 5 percent  
 Poorly drained soils: 0 to 5 percent  
 Soils that have a cobbly loam surface: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 532—Carten loam, cool, 0 to 4 percent slopes

#### Setting

*Landform:* Outwash plains  
*Slope:* 0 to 4 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Carten and similar soils: 85 percent

##### Minor Components

Poorly drained soils: 0 to 15 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 562—Carten loam, 0 to 4 percent slopes

#### Setting

*Landform:* Outwash plains  
*Slope:* 0 to 4 percent  
*Elevation:* 3,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Carten and similar soils: 85 percent

##### Minor Components

Poorly drained soils: 0 to 15 percent

#### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Castner Series

*Depth class:* Shallow  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Hills  
*Parent material:* Sandstone residuum  
*Slope range:* 0 to 45 percent  
*Elevation range:* 3,600 to 5,200 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

### Typical Pedon

Castner channery loam, in an area of Dolus-Castner channery loams, 15 to 45 percent slopes, in an area of rangeland, 100 feet south and 375 feet west of the northeast corner of sec. 20, T. 9 N., R. 9 W.

A—0 to 8 inches; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; weak medium granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many very fine discontinuous random pores; 5 percent flagstones and 30 percent channers; neutral; clear smooth boundary.

Bw—8 to 12 inches; brown (10YR 5/3) extremely channery loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; common very fine continuous pores; 20 percent flagstones and 40 percent channers; neutral; clear smooth boundary.

Bk—12 to 16 inches; light brownish gray (2.5Y 6/2) extremely channery loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; few very fine continuous pores; 25 percent flagstones and 50 percent channers; disseminated lime; strongly effervescent; moderately alkaline.

R—16 inches; hard shattered sandstone.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 15 inches

*Depth to bedrock:* 10 to 20 inches

*Depth to the k horizon:* 7 to 15 inches

#### A horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Clay content: 10 to 18 percent, with less than 35 percent fine and coarser sand

Content of rock fragments: 15 to 35 percent—0 to 5 percent flagstones; 15 to 30 percent channers

Reaction: pH 6.6 to 7.8

#### Bw horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 3 to 5 dry; 2 to 4 moist

Chroma: 1 to 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent, with less than 35 percent fine and coarser sand

Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles and flagstones; 30 to 55 percent pebbles and channers

Reaction: pH 6.6 to 8.4

#### Bk horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent, with less than 35 percent fine and coarser sand

Content of rock fragments: 35 to 80 percent—10 to 25 percent cobbles and flagstones; 25 to 60 percent pebbles and channers

Calcium carbonate equivalent: 3 to 15 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

### Cetrack Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate to the 2C horizon, rapid below

*Landform:* Alluvial fans and stream terraces

*Parent material:* Calcareous alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 3,600 to 5,000 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 40 to 44 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 cropland, 950 feet south and 1,100 feet west of the northeast corner of sec. 20, T. 7 N., R. 9 W.

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 pebbles; disseminated 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 pebbles; disseminated 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 pebbles; disseminated 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, soft, nonsticky, nonplastic; few very fine, fine, and medium roots; 35 percent pebbles; few faint lime casts on underside of coarse fragments; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 8 and 12 inches; dry in all parts less than five-tenths and dry in some part more than six-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 14 inches

*Depth to very gravelly material:* 20 to 40 inches

*Depth to the calcic horizon:* 8 to 14 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 pebbles

Reaction: pH 6.1 to 7.8

#### *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 pebbles

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

Clay content: 18 to 25 percent

Content of rock fragments: 5 to 20 percent—0 to 5 percent cobbles; 5 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 20 percent

Reaction: pH 7.4 to 8.4

#### *Bk2 and Bk3 horizons*

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 pebbles

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 pebbles

Reaction: pH 7.4 to 8.4

## **34B—Cetrack loam, 0 to 4 percent slopes**

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,600 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Cetrack and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 4 percent: 0 to 3 percent

Somewhat poorly drained soils: 0 to 3 percent

Cetrack cobbly loam: 0 to 3 percent

Soils that are very gravelly: 0 to 3 percent  
 Soils that have a calcareous surface layer: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 34C—Cetrack loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,600 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Cetrack and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 8 percent: 0 to 5 percent  
 Cetrack cobbly loam: 0 to 5 percent  
 Soils that are very gravelly: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Clasoil Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains, alluvial fans, and stream terraces  
*Parent material:* Alluvium and colluvium derived from granite and other coarse-grained igneous rocks  
*Slope range:* 0 to 35 percent  
*Elevation range:* 3,500 to 5,200 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Clasoil sandy loam, in an area of Clasoil-Crackerville complex, 15 to 35 percent slopes, in an area of rangeland, 400 feet south and 2,200 feet east of the northwest corner of sec. 8, T. 6 N., R. 8 W.

- A—0 to 11 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak fine granular structure; soft, friable, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine continuous irregular pores; 5 percent cobbles and 5 percent pebbles; moderately acid; clear smooth boundary.
- Bt1—11 to 16 inches; brown (10YR 5/3) gravelly sandy clay loam, brown (10YR 4/3), dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine and few medium roots; many very fine continuous irregular pores; few faint clay films on faces of peds; 20 percent pebbles; slightly acid; clear smooth boundary.
- Bt2—16 to 20 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine and few medium

roots; many very fine continuous irregular pores; few faint clay films on faces of peds; 5 percent cobbles and 20 percent pebbles; slightly alkaline; clear smooth boundary.

**Bt3**—20 to 31 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; many very fine, common fine, and few medium roots; common very fine continuous irregular pores; common distinct clay bridging between sand grains; 5 percent cobbles and 25 percent pebbles; slightly alkaline; clear smooth boundary.

**BC**—31 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine continuous pores; 10 percent cobbles and 30 percent pebbles; slightly alkaline.

#### Range in Characteristics

*Soil temperature:* 38 to 43 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 15 inches

*Depth to the argillic horizon:* 7 to 22 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 2 to 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 12 to 20 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 5.6 to 7.3

#### Bt horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Sandy clay loam, loam, or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent stones and cobbles; 5 to 30 percent pebbles

Reaction: pH 5.6 to 7.3

#### BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Sandy loam, loam, or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 40 percent—0 to 20 percent stones and cobbles; 15 to 35 percent pebbles

Reaction: pH 6.1 to 7.8

### 152B—Clasoil sandy loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,500 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Clasoil and similar soils: 85 percent

##### Minor Components

Very gravelly loamy soils: 0 to 8 percent

Soils that have slopes more than 8 percent: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 152C—Clasoil sandy loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 3,500 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

## Composition

### Major Components

Clasoil and similar soils: 85 percent

### Minor Components

Very gravelly loamy soils: 0 to 8 percent  
Soils that have slopes more than 8 percent: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 152D—Clasoil sandy loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 3,500 to 5,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

## Composition

### Major Components

Clasoil and similar soils: 85 percent

### Minor Components

Very gravelly loamy soils: 0 to 8 percent  
Areas of rock outcrop: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 552C—Clasoil-Crackerville complex, 4 to 8 percent slopes

### Setting

*Landform:*

- Clasoil—Mountains
- Crackerville—Mountains

*Slope:*

- Clasoil—4 to 8 percent
- Crackerville—4 to 8 percent

*Elevation:* 3,500 to 5,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

## Composition

### Major Components

Clasoil and similar soils: 50 percent  
Crackerville and similar soils: 35 percent

### Minor Components

Soils that are shallow to bedrock: 0 to 5 percent  
Areas of rock outcrop: 0 to 5 percent  
Soils that have a stony surface: 0 to 5 percent

### Major Component Description

#### Clasoil

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

#### Crackerville

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from granitic rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 552D—Clasoil-Crackerville complex, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Clasoil—Mountains
- Crackerville—Mountains

#### *Slope:*

- Clasoil—8 to 15 percent
- Crackerville—8 to 15 percent

*Elevation:* 3,500 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Clasoil and similar soils: 50 percent

Crackerville and similar soils: 35 percent

#### Minor Components

Soils that are shallow to bedrock: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that have a stony surface: 0 to 5 percent

### Major Component Description

#### Clasoil

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

#### Crackerville

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from granitic rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 552E—Clasoil-Crackerville complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Clasoil—Mountains
- Crackerville—Mountains

#### *Slope:*

- Clasoil—15 to 35 percent
- Crackerville—15 to 35 percent

*Elevation:* 3,500 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Clasoil and similar soils: 50 percent

Crackerville and similar soils: 35 percent

#### Minor Components

Soils that are shallow to bedrock: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that have a stony surface: 0 to 5 percent

### Major Component Description

#### Clasoil

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

#### Crackerville

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 752E—Clasoil-Crackerville-Rock outcrop complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Clasoil—Mountains
- Crackerville—Mountains
- Rock outcrop—Mountains

#### *Slope:*

- Clasoil—15 to 35 percent
- Crackerville—15 to 35 percent

*Elevation:* 3,500 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Clasoil and similar soils: 40 percent

Crackerville and similar soils: 30 percent

Rock outcrop: 15 percent

#### Minor Components

Soils that have a stony surface: 0 to 5 percent

Soils that are shallow to bedrock: 0 to 5 percent

Soils that have slopes more than 35 percent: 0 to 5 percent

### Major Component Description

#### Clasoil

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

#### Crackerville

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from granitic rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Coben Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 4,000 to 5,200 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Coben loam, 4 to 8 percent slopes, in an area of cropland, 1,700 feet north and 2,475 feet east of the southwest corner of sec. 21, T. 12 N., R. 12 W.

Ap1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and common fine and medium roots; many very fine and common fine continuous random pores; 5 percent pebbles; slightly acid; clear smooth boundary.

Ap2—4 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky, slightly plastic; common very fine, fine, and medium roots; common very fine and fine continuous random pores; 5 percent pebbles; neutral; abrupt smooth boundary.

Bt1—6 to 12 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium and coarse columnar structure;

extremely hard, extremely firm, very sticky, very plastic; few very fine and fine roots; few very fine continuous random tubular pores; many distinct clay films on faces of peds and lining pores; 5 percent pebbles; neutral; gradual smooth boundary.

**Bt2**—12 to 23 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; strong medium prismatic structure; extremely hard, extremely firm, very sticky, very plastic; few very fine and fine roots; few very fine continuous random tubular pores; continuous distinct clay films on faces of peds and lining pores; 5 percent pebbles; neutral; gradual wavy boundary.

**Bk**—23 to 30 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure parting to moderate medium granular structure; very hard, very firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine and fine pores; 5 percent pebbles; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

**BC**—30 to 60 inches; very pale brown (10YR 7/3) gravelly clay loam, brown (10YR 5/3) moist; massive; slightly hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine pores; 20 percent pebbles; common faint lime casts on underside of coarse fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 38 to 43 degrees F

*Moisture control section:* Between depths of 4 to 12 inches

*Depth to lime:* 12 to 30 inches

*Depth to the Bt horizon:* 4 to 7 inches

#### *Ap horizons*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### *Bt horizons*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Clay, silty clay, or clay loam

Clay content: 35 to 60 percent

Content of rock fragments: 0 to 10 percent pebbles

Sodium adsorption ratio: 0 to 8 percent

Reaction: pH 6.6 to 8.4

#### *Bk horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay, clay loam, or silty clay loam

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### *BC horizon*

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent pebbles

Reaction: pH 7.4 to 8.4

## 58B—Coben loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Coben and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 4 percent: 0 to 5 percent

Coben cobbly loam: 0 to 5 percent

Soils that have high lime subsoils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 58C—Coben loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Coben and similar soils: 85 percent

##### Minor Components

Soils that have slopes more than 8 percent: 0 to 5 percent

Coben cobbly loam: 0 to 5 percent

Soils that have high lime subsoils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 58D—Coben loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Coben and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 15 percent: 0 to 5 percent

Coben cobbly loam: 0 to 5 percent

Soils that have high lime subsoils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Comad Series

*Depth class:* Very deep

*Drainage class:* Excessively drained

*Permeability:* Rapid

*Landform:* Mountains

*Parent material:* Granitic colluvium

*Slope range:* 8 to 60 percent

*Elevation range:* 4,600 to 7,500 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 35 to 38 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.

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

E1—0 to 4 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; 25 percent stones, 20 percent cobbles, and 10 percent pebbles; moderately acid; clear wavy boundary.

E2—4 to 17 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, and 10 percent pebbles; moderately acid; gradual wavy boundary.

E and Bt—17 to 42 inches; 80 percent is light brownish gray (10YR 6/2) extremely stony loamy sand, grayish brown (10YR 5/2) moist (E part); 20 percent is brownish yellow (10YR 6/6) sandy clay loam lamellae  $\frac{1}{4}$ - to  $\frac{1}{2}$ -inch thick, yellowish brown (10YR 5/6) moist (B part); 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, and 20 percent pebbles; slightly acid; diffuse wavy boundary.

C—42 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, and 20 percent pebbles; neutral.

Content of rock fragments: 35 to 80 percent—  
10 to 35 percent boulders and stones; 15 to 25 percent cobbles; 10 to 20 percent pebbles  
Reaction: pH 5.1 to 7.3

#### *E and Bt1 horizon*

Hue: 7.5YR or 10YR  
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, 4, or 6  
Texture: Sand, coarse sand, or loamy sand; the  
lamellae are sandy loam or sandy clay loam  
Clay content: 0 to 10 percent  
Content of rock fragments: 40 to 80 percent—  
15 to 35 percent stones; 15 to 25 percent  
cobbles; 10 to 20 percent pebbles  
Reaction: pH 5.1 to 7.3

#### *C horizon*

Hue: 7.5YR or 10YR  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Texture: Sand or loamy sand  
Clay content: 0 to 10 percent  
Content of rock fragments: 40 to 80 percent—  
15 to 35 percent stones; 15 to 25 percent  
cobbles; 10 to 20 percent pebbles  
Reaction: pH 5.1 to 7.3

### **280E—Comad-Elkner-Rock outcrop complex, 15 to 35 percent slopes**

#### **Range in Characteristics**

#### **Setting**

*Soil temperature:* 36 to 43 degrees F

*Moisture control section:* Between depths of 12 and 35 inches

*Depth to lamellae:* 13 to 20 inches

*Soil phases:* Bouldery

#### *E1 horizon*

Hue: 7.5YR or 10YR  
Value: 6 or 7 dry; 3 to 5 moist  
Chroma: 2 or 3  
Clay content: 5 to 15 percent  
Content of rock fragments: 35 to 85 percent—5 to  
35 percent boulders and stones; 20 to  
30 percent cobbles; 10 to 15 percent pebbles  
Reaction: pH 5.1 to 7.3

#### *E2 horizon*

Hue: 7.5YR or 10YR  
Value: 6 to 8 dry; 3 to 6 moist  
Chroma: 2 or 3  
Clay content: 5 to 15 percent

#### *Landform:*

- Comad—Mountains
- Elkner—Mountains
- Rock outcrop—Mountains

#### *Slope:*

- Comad—15 to 35 percent
- Elkner—15 to 35 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### **Composition**

##### **Major Components**

Comad and similar soils: 40 percent  
Elkner and similar soils: 25 percent  
Rock outcrop: 20 percent

##### **Minor Components**

Soils that are less than 40-inches deep: 0 to  
8 percent  
Areas of rubble land: 0 to 7 percent

### Major Component Description

#### Comad

*Surface layer texture:* Extremely bouldery sandy loam

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

*Drainage class:* Excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

#### Elkner

*Surface layer texture:* Bouldery sandy loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 280F—Comad-Elkner-Rock outcrop complex, 35 to 60 percent slopes

### Setting

*Landform:*

- Comad—Mountains
- Elkner—Mountains
- Rock outcrop—Mountains

*Slope:*

- Comad—35 to 60 percent
- Elkner—35 to 60 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Comad and similar soils: 40 percent

Elkner and similar soils: 25 percent

Rock outcrop: 20 percent

### Minor Components

Soils that are less than 40-inches deep: 0 to 8 percent

Areas of rubble land: 0 to 7 percent

### Major Component Description

#### Comad

*Surface layer texture:* Extremely bouldery sandy loam

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

*Drainage class:* Excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

#### Elkner

*Surface layer texture:* Bouldery sandy loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 580E—Comad-Elkner complex, 15 to 35 percent slopes

### Setting

*Landform:*

- Comad—Mountains
- Elkner—Mountains

*Slope:*

- Comad—15 to 35 percent
- Elkner—15 to 35 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Comad and similar soils: 65 percent  
Elkner and similar soils: 20 percent

#### Minor Components

Soils that have slopes more than 35 percent: 0 to 5 percent  
Areas of rock outcrop: 0 to 5 percent  
Soils that are moderately deep: 0 to 5 percent

#### Major Component Description

##### Comad

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

##### Elkner

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 580F—Comad-Elkner complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Comad—Mountains
- Elkner—Mountains

##### *Slope:*

- Comad—35 to 60 percent
- Elkner—35 to 60 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Comad and similar soils: 65 percent  
Elkner and similar soils: 20 percent

#### Minor Components

Soils that have slopes more than 60 percent: 0 to 5 percent  
Areas of rock outcrop: 0 to 5 percent  
Soils that are moderately deep: 0 to 5 percent

#### Major Component Description

##### Comad

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

##### Elkner

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 680F—Comad-Rubble land complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Comad—Mountains
- Rubble land—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

## Composition

### Major Components

Comad and similar soils: 65 percent  
Rubble land: 20 percent

### Minor Components

Soils that have a cobbly sandy loam subsoil: 0 to 5 percent  
Soils that have slopes more than 60 percent: 0 to 5 percent  
Areas of rock outcrop: 0 to 5 percent

## Major Component Description

### Comad

*Surface layer texture:* Extremely bouldery sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

### Rubble land

*Definition:* Areas having more than 90 percent boulders, stones, and cobbles on the surface, supporting little or no vegetation

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Con Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*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 44 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 pebbles; 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 pebbles; 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 coatings and casts on surface of pebbles; common fine masses of lime; violently effervescent; 5 percent pebbles; 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 pebbles; continuous distinct lime casts and coatings on surface of pebbles; 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 pebbles; continuous distinct lime casts and coatings on surface of pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 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 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles  
 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 pebbles  
 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 pebbles  
 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 pebbles  
 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 pebbles  
 Calcium carbonate equivalent: 15 to 25 percent  
 Reaction: pH 7.9 to 8.4

**24B—Con loam, 0 to 4 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Con and similar soils: 85 percent

**Minor Components**

Con very gravelly loam: 0 to 10 percent  
 Soils that are somewhat poorly drained: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**24C—Con loam, 4 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Con and similar soils: 85 percent

**Minor Components**

Con very gravelly loam: 0 to 10 percent  
 Soils that are somewhat poorly drained: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 24D—Con loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Con and similar soils: 85 percent

#### Minor Components

Con very gravelly loam: 0 to 15 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 824E—Con-Sixbeacon cobbly loams, 15 to 35 percent slopes

### Setting

*Landform:*

- Con—Alluvial fans and stream terraces
- Sixbeacon—Alluvial fans

*Slope:*

- Con—15 to 35 percent

- Sixbeacon—15 to 35 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Con and similar soils: 55 percent

Sixbeacon and similar soils: 30 percent

#### Minor Components

Con, calcareous surface: 0 to 5 percent

Soils that have slopes more than 35 percent: 0 to 5 percent

Soils that have a gravelly clay loam subsoil: 0 to 5 percent

### Major Component Description

#### Con

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.5 inches

#### Sixbeacon

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 824F—Con-Sixbeacon cobbly loams, 35 to 60 percent slopes

### Setting

*Landform:*

- Con—Alluvial fans and stream terraces
- Sixbeacon—Alluvial fans

*Slope:*

- Con—35 to 60 percent
- Sixbeacon—35 to 60 percent

*Elevation:* 4,000 to 5,000 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 90 to 105 days**Composition****Major Components**

Con and similar soils: 55 percent

Sixbeacon and similar soils: 30 percent

**Minor Components**

Con, calcareous surface: 0 to 8 percent

Soils that have a gravelly clay loam subsoil: 0 to 7 percent

**Major Component Description****Con***Surface layer texture:* Cobbly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 8.5 inches**Sixbeacon***Surface layer texture:* Cobbly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 7.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Copenhaver Series***Depth class:* Shallow*Drainage class:* Well drained*Permeability:* Moderately slow*Landform:* Hills and mountains*Parent material:* Material derived from andesite and basalt*Slope range:* 8 to 60 percent*Elevation range:* 5,000 to 8,600 feet*Annual precipitation:* 18 to 22 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-Monad-Copenhaver complex, 8 to 15 percent slopes, in an area of rangeland, 350 feet south and 250 feet east of the northwest corner of sec. 15, T. 8 N., R. 8 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine pores; 25 percent pebbles; neutral; clear smooth boundary.

Bt—5 to 14 inches; reddish brown (5YR 5/3) very gravelly clay loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; very hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; few faint clay films on faces of peds and on coarse fragments; 10 percent cobbles and 40 percent pebbles; slightly alkaline.

R—14 inches; andesite bedrock.

**Range in Characteristics***Soil temperature:* 36 to 41 degrees F*Moisture control section:* Between depths of 4 and 12 inches*Depth to bedrock:* 10 to 20 inches*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 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 6.6 to 7.3

*Bt horizon*

Hue: 5YR or 7.5YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4 or 6

Clay content: 27 to 35 percent

Content of rock fragments: 35 to 80 percent—5 to 20 percent cobbles; 30 to 60 percent pebbles

Reaction: pH 7.4 to 7.8

## Crackerville Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Granitic residuum and colluvium

*Slope range:* 4 to 35 percent

*Elevation range:* 3,500 to 5,200 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Crackerville loam, in an area of Clasoil-Crackerville complex, 8 to 15 percent slopes, in an area of rangeland, 400 feet north and 2,400 feet east of the southwest corner of sec. 5, T. 6 N., R. 8 W.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, nonsticky, slightly plastic; many very fine and fine roots; many very fine continuous interstitial pores; 5 percent cobbles and 5 percent pebbles; strongly acid; clear smooth boundary.

A2—5 to 8 inches; brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and common fine roots; many very fine discontinuous interstitial pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—8 to 14 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine discontinuous interstitial pores; common faint clay films on faces of peds and on pebbles; 5 percent cobbles and 35 percent pebbles; slightly alkaline; clear smooth boundary.

Bt2—14 to 23 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine discontinuous interstitial pores;

common faint clay films on faces of peds and on pebbles; 10 percent cobbles and 40 percent pebbles; slightly alkaline; clear smooth boundary.

Cr—23 to 32 inches; yellowish brown (10YR 5/4) semiconsolidated bedrock.

R—32 inches; granite bedrock.

### Range in Characteristics

*Soil temperature:* 40 to 44 degrees F

*Moisture control section:* Between depths of 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 horizons

Hue: 10YR or 2.5Y

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 15 percent—0 to 5 percent cobbles; 5 to 10 percent pebbles (pebbles are mainly less than 7 mm in diameter)

Reaction: pH 5.1 to 7.3

#### Bt horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3, 4, or 6 dry

Texture: Sandy clay loam or coarse sandy clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent pebbles (pebbles are mainly less than 7 mm in diameter)

Reaction: pH 6.6 to 7.8

## Crow Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains, moraines, and hills

*Parent material:* Colluvium derived from fine-grained extrusive igneous rocks and alpine till

*Slope range:* 4 to 50 percent

*Elevation range:* 4,000 to 5,800 feet

*Annual precipitation:* 18 to 30 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid  
Typic Haplustalfs

### Typical Pedon

Crow loam, in an area of Crow-Bignell complex, 15 to 35 percent slopes, in an area of woodland, 2,300 feet south and 1,500 feet west of the northeast corner of sec. 9, T. 12 N., R. 9 W.

E—0 to 3 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine discontinuous irregular pores; slightly acid; clear smooth boundary.

Bt/E—3 to 7 inches; 60 percent is brown (10YR 5/3) clay, dark brown (10YR 4/3) moist (B part); 40 percent is light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist tongues (E part); moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine discontinuous irregular pores; slightly acid; clear smooth boundary.

Bt1—7 to 17 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; common very fine and fine discontinuous irregular pores; many prominent clay films on faces of peds; neutral; clear wavy boundary.

Bt2—17 to 31 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, moderately plastic; few very fine and fine roots; common very fine and fine discontinuous irregular pores; many prominent clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

BC—31 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, slightly sticky, moderately plastic; few very fine and fine roots; few very fine and fine discontinuous irregular pores; few faint clay bridges; 5 percent cobbles and 10 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

### E horizon

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 10 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 5.6 to 6.5

### Bt/E horizon

Hue: 10YR or 2.5Y

Value: B part—5 or 6 dry, 4 or 5 moist; E part—6 to 8 dry, 5 or 6 moist

Chroma: B part—2 to 4; E part—2 or 3

Texture, mixed: Silty clay loam, clay loam, loam, or silt loam

Clay content, mixed: 20 to 40 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

### Bt horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silty clay, clay, sandy clay, or clay loam

Clay content: 35 to 60 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

### BC horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy clay loam, clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.8

## 83D—Crow clay loam, 4 to 15 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 4 to 15 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Crow and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 15 percent: 0 to 15 percent

**Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**83E—Crow clay loam,  
15 to 35 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 5,800 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Crow and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 35 percent: 0 to 15 percent

**Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**283D—Crow clay loam, moist,  
4 to 15 percent slopes****Setting**

*Landform:* Moraines  
*Slope:* 4 to 15 percent  
*Elevation:* 4,000 to 5,800 feet  
*Mean annual precipitation:* 24 to 30 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Crow and similar soils: 85 percent

**Minor Components**

Bignell soils: 0 to 5 percent  
 Poorly drained soils: 0 to 5 percent  
 Soils that are calcareous throughout: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**283E—Crow clay loam, moist,  
15 to 35 percent slopes****Setting**

*Landform:* Moraines  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 5,800 feet  
*Mean annual precipitation:* 24 to 30 inches  
*Frost-free period:* 70 to 90 days

## Composition

### Major Components

Crow and similar soils: 85 percent

### Minor Components

Bignell soils: 0 to 5 percent

Soils that are calcareous throughout: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 883E—Crow-Bignell complex, moist, 8 to 25 percent slopes

### Setting

*Landform:*

- Crow—Moraines
- Bignell—Moraines

*Slope:*

- Crow—8 to 25 percent
- Bignell—8 to 25 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Crow and similar soils: 45 percent

Bignell and similar soils: 40 percent

#### Minor Components

Whitecow soils: 0 to 6 percent

Winkler soils: 0 to 6 percent

Poorly drained soils: 0 to 3 percent

### Major Component Description

#### Crow

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

#### Bignell

*Surface layer texture:* Gravelly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 883F—Crow-Bignell complex, moist, 25 to 50 percent slopes

### Setting

*Landform:*

- Crow—Moraines
- Bignell—Moraines

*Slope:*

- Crow—25 to 50 percent
- Bignell—25 to 50 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Crow and similar soils: 45 percent

Bignell and similar soils: 40 percent

#### Minor Components

Whitecow soils: 0 to 6 percent

Winkler soils: 0 to 6 percent

Poorly drained soils: 0 to 3 percent

### Major Component Description

#### Crow

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.0 inches

### **Bignell**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **983D—Crow-Bignell complex, 8 to 15 percent slopes**

### **Setting**

#### *Landform:*

- Crow—Mountains
- Bignell—Mountains

#### *Slope:*

- Crow—8 to 15 percent
- Bignell—8 to 15 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Crow and similar soils: 45 percent  
 Bignell and similar soils: 40 percent

#### **Minor Components**

Soils that have slopes more than 15 percent: 0 to 4 percent  
 Soils that are moderately deep: 0 to 4 percent  
 Poorly drained soils: 0 to 4 percent  
 Trapps soils: 0 to 3 percent

### **Major Component Description**

#### **Crow**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.0 inches

### **Bignell**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **983E—Crow-Bignell complex, 15 to 35 percent slopes**

### **Setting**

#### *Landform:*

- Crow—Mountains
- Bignell—Mountains

#### *Slope:*

- Crow—15 to 35 percent
- Bignell—15 to 35 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Crow and similar soils: 45 percent  
 Bignell and similar soils: 40 percent

#### **Minor Components**

Soils that have slopes more than 35 percent: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are moderately deep: 0 to 3 percent  
 Trapps soils: 0 to 2 percent  
 Hoyt soils: 0 to 2 percent  
 Poorly drained soils: 0 to 2 percent

## Major Component Description

### Crow

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 9.0 inches

### Bignell

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Danaher Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Slow  
*Landform:* Mountains  
*Parent material:* Material derived from igneous rock  
*Slope range:* 4 to 60 percent  
*Elevation range:* 5,000 to 8,000 feet  
*Annual precipitation:* 22 to 28 inches  
*Annual air temperature:* 35 to 38 degrees F  
*Frost-free period:* 30 to 70 days

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

### Typical Pedon

Danaher loam, in an area of Danaher-Loberg, complex, 15 to 35 percent slopes, in an area of woodland, 300 feet north and 650 feet east of the southwest corner of sec. 25, T. 11 N., R. 10 W.

Oi—2.5 to 2 inches; undecomposed forest litter.  
 Oe—2 inches to 0; decomposed forest litter.  
 E—0 to 3 inches; light brownish gray (10YR 6/2) loam, dark 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 continuous irregular pores; slightly acid; clear wavy boundary.

E/Bt—3 to 7 inches; 70 percent is light brownish gray (10YR 6/2) silt loam, dark brown (10YR 4/3) moist tongues (E part); 30 percent is grayish brown (10YR 5/2) clay loam, brown (7.5YR 4/2) moist (B part); weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; common very fine and fine irregular pores; 5 percent pebbles; slightly acid; gradual wavy boundary.

Bt1—7 to 20 inches; brown (7.5YR 5/4) clay loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine and fine irregular pores; many faint clay films on faces of peds; 10 percent pebbles; moderately acid; gradual wavy boundary.

Bt2—20 to 38 inches; reddish brown (5YR 5/3) clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine roots; few fine discontinuous tubular pores; continuous faint clay films on faces of peds; 10 percent pebbles; slightly acid; gradual wavy boundary.

Bt3—38 to 60 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few very fine roots; few fine discontinuous tubular pores; few faint clay films on faces of peds; 10 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 37 to 42 degrees F  
*Moisture control section:* Between depths of 4 and 12 inches

#### E horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR  
 Value: 6 or 7 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Reaction: pH 5.6 to 7.3

#### E/Bt horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR  
 Value: E part—6 or 7 dry, 4 or 5 moist; B part—4 or 5 dry, 3 or 4 moist

Chroma: 2 or 3  
 Texture: Silt loam, clay loam, or silty clay loam  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Reaction: pH 5.6 to 7.3

**Bt horizons**

Hue: 2.5YR, 5YR, 7.5YR, or 10YR  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 3, 4, or 6  
 Texture: Clay loam or clay  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 0 to 25 percent pebbles  
 Reaction: pH 5.6 to 7.3

### 87D—Danaher loam, 4 to 15 percent slopes

**Setting**

*Landform:* Mountains  
*Slope:* 4 to 15 percent  
*Elevation:* 5,000 to 8,000 feet  
*Mean annual precipitation:* 22 to 28 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Danaher and similar soils: 85 percent

**Minor Components**

Poorly drained soils: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 87E—Danaher loam, 15 to 35 percent slopes

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,000 to 8,000 feet  
*Mean annual precipitation:* 22 to 28 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Danaher and similar soils: 85 percent

**Minor Components**

Poorly drained soils: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 387E—Danaher-Loberg complex, 15 to 35 percent slopes

**Setting**

*Landform:*

- Danaher—Mountains
- Loberg—Mountains

*Slope:*

- Danaher—15 to 35 percent
- Loberg—15 to 35 percent

*Elevation:* 5,000 to 7,500 feet  
*Mean annual precipitation:* 22 to 28 inches  
*Frost-free period:* 30 to 70 days

## Composition

### Major Components

Danaher and similar soils: 50 percent

Loberg and similar soils: 35 percent

### Minor Components

Areas of rock outcrop: 0 to 4 percent

Soils that are moderately deep: 0 to 4 percent

Soils that have slopes more than 35 percent: 0 to 4 percent

Poorly drained soils: 0 to 3 percent

## Major Component Description

### Danaher

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 8.9 inches

### Loberg

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Danvers Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Alluvial fans and stream terraces

*Parent material:* Calcareous alluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 3,800 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 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, 1,300 feet north and 2,450 feet west of the southeast corner of sec. 18, T. 7 N., R. 8 W.

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 structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine and few medium 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 structure; slightly hard, very friable, moderately sticky, moderately plastic; many fine and few medium roots; many fine and common fine tubular irregular random 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 tubular random 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, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, moderately plastic; common fine roots; many fine and few medium tubular random pores; 5 percent pebbles; disseminated lime; prominent lime casts on bottom of pebbles; 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 and 10 percent pebbles; disseminated lime; prominent lime casts on bottom of rock fragments; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; never dry in all parts of the moisture control section for 45 consecutive days

*Thickness of the mollic epipedon:* 7 to 12 inches

*Depth to the calcic horizon:* 14 to 25 inches

*Soil phases:* Stony

#### 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 stones and cobbles; 0 to 20 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Silty clay loam, clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 8.4

#### Btk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Clay, clay loam, or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 10 to 20 percent

Reaction: pH 7.4 to 8.4

#### Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 5 or 6 moist

Chroma: 1 to 3

Texture: Silty clay, clay loam, silty clay loam, or clay

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 20 to 40 percent

Reaction: pH 7.4 to 8.4

## 49B—Danvers clay loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 85 percent

#### Minor Components

Danvers cobbly clay loam: 0 to 4 percent

Soils that have slopes more than 4 percent: 0 to 4 percent

Soils that are very gravelly throughout: 0 to 4 percent

Soils that are calcareous throughout: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### **49C—Danvers clay loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Danvers and similar soils: 85 percent

##### **Minor Components**

Soils that have a cobbly surface layer: 0 to 4 percent  
 Soils that have slopes more than 8 percent: 0 to 4 percent  
 Soils that are very gravelly throughout: 0 to 4 percent  
 Soils that are calcareous throughout: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **49D—Danvers clay loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Danvers and similar soils: 85 percent

##### **Minor Components**

Danvers cobbly clay loam: 0 to 4 percent  
 Soils that have slopes more than 15 percent: 0 to 4 percent  
 Soils that are very gravelly throughout: 0 to 4 percent  
 Soils that are calcareous throughout: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **149B—Danvers cobbly clay loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Danvers and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 4 percent: 0 to 15 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 149C—Danvers cobbly clay loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 8 percent: 0 to 15 percent

### Major Component Description

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 149D—Danvers cobbly clay loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 15 percent: 0 to 8 percent  
Roy soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 446B—Danvers-Roy complex, 0 to 4 percent slopes

### Setting

*Landform:*

- Danvers—Alluvial fans
- Roy—Alluvial fans

*Slope:*

- Danvers—0 to 4 percent
- Roy—0 to 4 percent

*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 50 percent  
Roy and similar soils: 35 percent

#### Minor Components

Soils that have slopes more than 4 percent: 0 to 5 percent  
Danvers cobbly loam: 0 to 5 percent  
Winspect soils: 0 to 5 percent

### Major Component Description

#### Danvers

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

#### Roy

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 446C—Danvers-Roy complex, 4 to 8 percent slopes

#### Setting

##### *Landform:*

- Danvers—Alluvial fans
- Roy—Alluvial fans

##### *Slope:*

- Danvers—4 to 8 percent
- Roy—4 to 8 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 50 percent

Roy and similar soils: 35 percent

#### Minor Components

Soils that have slopes more than 8 percent: 0 to 5 percent

Winspect soils: 0 to 5 percent

Danvers cobbly loam: 0 to 5 percent

### Major Component Description

#### Danvers

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

#### Roy

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 446D—Danvers-Roy complex, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Danvers—Alluvial fans
- Roy—Alluvial fans

##### *Slope:*

- Danvers—8 to 15 percent
- Roy—8 to 15 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Danvers and similar soils: 50 percent

Roy and similar soils: 35 percent

#### Minor Components

Soils that have slopes more than 15 percent: 0 to 5 percent

Cobbly loam soils: 0 to 5 percent

Winspect soils: 0 to 5 percent

## Major Component Description

### Danvers

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

### Roy

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Dolus Series

*Depth class:* Moderately deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Hills  
*Parent material:* Semiconsolidated sedimentary beds  
*Slope range:* 4 to 45 percent  
*Elevation range:* 3,600 to 5,200 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Aridic Haplustolls

## Typical Pedon

Dolus channery loam, in an area of Dolus-Castner channery loams, 15 to 45 percent slopes, in an area of rangeland, 1,600 feet south and 650 feet west of the northeast corner of sec. 9, T. 9 N., R. 9 W.

A—0 to 8 inches; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, nonsticky,

nonplastic; many very fine and fine and few medium roots; many very fine irregular pores; 20 percent channers; neutral; clear smooth boundary.

Bw—8 to 16 inches; brown (10YR 5/3) very channery loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine irregular pores; 40 percent channers; neutral; clear smooth boundary.

Bk—16 to 32 inches; light brownish gray (2.5Y 6/2) very channery loam, grayish brown (2.5Y 5/2) moist; weak medium granular structure; slightly hard, firm, slightly sticky, moderately plastic; common very fine and fine roots; common very fine irregular pores; 45 percent channers; disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—32 to 60 inches; light yellowish brown (2.5Y 6/4) semiconsolidated sandstone.

## Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 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 a depth of 20 inches is 41 degrees F or higher

*Thickness of the mollic epipedon:* 7 to 10 inches

*Depth to the Cr horizon:* 20 to 40 inches

### A horizon

Chroma: 2 or 3

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent channers

Reaction: pH 6.6 to 7.3

### Bw horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 50 percent—0 to 10 percent flagstones; 35 to 40 percent channers

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 7.3

### Bk horizon

Hue: 2.5Y or 10YR

Value: 5 or 6 dry; 4 to 6 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 40 to 60 percent—0 to 15 percent flagstones; 40 to 45 percent channers

Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.4 to 8.4

*Cr horizon*

Semiconsolidated sedimentary beds

**168C—Dolus-Boxwell complex,  
4 to 8 percent slopes**

**Setting**

*Landform:*

- Dolus—Hills
- Boxwell—Hills

*Slope:*

- Dolus—4 to 8 percent
- Boxwell—4 to 8 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Dolus and similar soils: 55 percent  
Boxwell and similar soils: 30 percent

**Minor Components**

Soils that are shallow to bedrock: 0 to 10 percent  
Areas of rock outcrop: 0 to 5 percent

**Major Component Description**

**Dolus**

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.1 inches

**Boxwell**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**168D—Dolus-Boxwell complex,  
8 to 15 percent slopes**

**Setting**

*Landform:*

- Dolus—Hills
- Boxwell—Hills

*Slope:*

- Dolus—8 to 15 percent
- Boxwell—8 to 15 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Dolus and similar soils: 55 percent  
Boxwell and similar soils: 30 percent

**Minor Components**

Soils that are shallow to bedrock: 0 to 10 percent  
Areas of rock outcrop: 0 to 5 percent

**Major Component Description**

**Dolus**

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.1 inches

**Boxwell**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 168E—Dolus-Boxwell complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Dolus—Hills
- Boxwell—Hills

#### *Slope:*

- Dolus—15 to 35 percent
- Boxwell—15 to 35 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Dolus and similar soils: 55 percent

Boxwell and similar soils: 30 percent

#### Minor Components

Soils that are shallow to bedrock: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

#### Dolus

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.1 inches

#### Boxwell

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 268F—Dolus-Castner channery loams, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Dolus—Hills
- Castner—Hills

#### *Slope:*

- Dolus—15 to 45 percent
- Castner—15 to 45 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Dolus and similar soils: 45 percent

Castner and similar soils: 40 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Soils that are calcareous throughout: 0 to 7 percent

### Major Component Description

#### Dolus

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.1 inches

#### Castner

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Doney Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills

*Parent material:* Semiconsolidated sedimentary beds

*Slope range:* 15 to 45 percent

*Elevation range:* 3,600 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:** Fine-loamy, mixed, superactive, frigid Typic Haplustepts

### Typical Pedon

Doney channery loam, in an area of Doney-Dolus channery loams, 15 to 45 percent slopes, in an area of rangeland, 1,500 feet north and 400 feet west of the southeast corner of sec. 10, T. 9 N., R. 10 W.

A—0 to 4 inches; gray (10YR 6/1) channery loam, grayish brown (10YR 5/2) moist; weak medium granular structure; soft, very friable, moderately sticky, moderately plastic; many fine, medium, and coarse roots; many very fine and fine discontinuous irregular pores; 15 percent channers; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—4 to 11 inches; light brownish gray (10YR 6/2) gravelly silty clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; many fine, medium, and coarse roots; common very fine and fine discontinuous pores; 15 percent pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—11 to 32 inches; light gray (2.5Y 7/2) silty clay loam, light brownish gray (2.5Y 6/2) moist; weak

fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; few very fine and fine discontinuous pores; 10 percent pebbles; common lime pendants; strongly effervescent; moderately alkaline; gradual wavy boundary. Cr—32 to 60 inches; white (10YR 8/1) semiconsolidated siltstone that crushes to silty clay loam.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to bedrock:* 20 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 to 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent flagstones; 15 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bw horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silty 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 pebbles

Calcium carbonate equivalent: Less than 15 percent

Reaction: pH 7.9 to 9.0

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silty clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

#### Cr horizon

Semiconsolidated sedimentary beds

## 169F—Doney-Dolus channery loams, 15 to 45 percent slopes

### Setting

#### Landform:

- Doney—Hills
- Dolus—Hills

#### Slope:

- Doney—15 to 45 percent
- Dolus—15 to 45 percent

*Elevation:* 3,600 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Doney and similar soils: 50 percent

Dolus and similar soils: 35 percent

#### Minor Components

Soils that are shallow to bedrock: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

#### Doney

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

#### Dolus

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Dougcliff Series

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Permeability:* Moderately rapid

*Landform:* Closed depressions

*Parent material:* Mucky peat

*Slope range:* 0 to 2 percent

*Elevation range:* 3,500 to 5,600 feet

*Annual precipitation:* 10 to 19 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

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

### 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.

Oi1—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 and nonplastic; slightly acid; clear smooth boundary.

Oi2—13 to 27 inches; black (10YR 2/1) mucky peat, black (10YR 2/1) dry; about 85 percent fiber, 80 percent rubbed; massive; nonsticky and nonplastic; slightly acid; clear smooth boundary.

Oi3—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 and nonplastic; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Depth of organic material:* Greater than 51 inches

*Depth to the seasonal high water table:* 0 to 6 inches

*Other features:* Some pedons have mineral materials at depths of 51 to 60 inches. Some pedons have an Oe horizon.

#### Oi1 horizon

Hue: 10YR or 7.5YR

Value: 2 moist

Chroma: 1 or 2

Fiber content: 80 to 90 percent unrubbed, 65 to 75 percent rubbed

Reaction: pH 6.1 to 7.8

#### Oi2 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

*Oi3 horizon*

Hue: 10YR, 7.5YR, or 5YR  
 Value: 2 or 3 moist  
 Fiber content: 80 to 90 percent unrubbed, 70 to 80 percent rubbed  
 Reaction: pH 6.1 to 7.8

**2—Dougcliff mucky peat,  
 0 to 2 percent slopes, ponded**

**Setting**

*Landform:* Closed depressions  
*Slope:* 0 to 2 percent  
*Elevation:* 3,500 to 5,600 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Dougcliff and similar soils: 85 percent

**Minor Components**

Poorly drained soils: 0 to 10 percent  
 Areas of open water: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Mucky-peat  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Peat  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Ponding:* Very long  
*Available water capacity:* Mainly 21.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**103—Dumps, mine**

**Setting**

*Landform:* Stream terraces  
*Slope:* 4 to 35 percent  
*Elevation:* 3,500 to 5,600 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 105 days

**Composition**

**Major Components**

Dumps, mine: 85 percent

**Minor Components**

Areas of soils that support vegetation: 0 to 15 percent

**Major Component Description**

*Definition:* Consists of mine waste from placer mining activities  
*Surface layer texture:* Variable  
*Depth class:* Very deep (more than 60 inches)  
*Flooding:* None  
*Available water capacity:* Mainly 0.9 inches

**DUMPS—Dumps, sanitary landfill**

**Composition**

**Major Components**

Dumps, sanitary landfill: 100 percent

**Major Component Description**

*Definition:* Areas that have been utilized for disposal of household and industrial waste. Soils previously present have been highly disturbed when used as daily cover in burying refuse.

**Elkner Series**

*Depth class:* Very deep  
*Drainage class:* Somewhat excessively drained  
*Permeability:* Moderately rapid to BC, rapid below  
*Landform:* Mountains  
*Parent material:* Granitic colluvium  
*Slope range:* 8 to 60 percent  
*Elevation range:* 4,600 to 7,500 feet  
*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 35 to 38 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 Elkner-Ovando complex, 15 to 35 percent slopes, in an area of woodland, 1,600 feet south and 2,640 feet east of the northwest corner of sec. 30, T. 13 N., R. 13 W.

Oi—3 to 0 inches; undecomposed and slightly decomposed forest litter.

E1—0 to 7 inches; pale brown (10YR 6/3) stony sandy loam, brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent stones, 5 percent cobbles, and 5 percent pebbles; moderately acid; clear wavy boundary.

E2—7 to 16 inches; light yellowish brown (10YR 6/4) stony coarse sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent stones, 5 percent cobbles, and 5 percent pebbles; slightly acid; clear wavy boundary.

E and Bt1—16 to 26 inches; 75 percent is light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist (E part); 25 percent is yellowish brown (10YR 5/4) coarse sandy loam lamellae  $\frac{1}{8}$ - to  $\frac{1}{4}$ -inch thick, dark yellowish brown (10YR 4/4) moist (B part); weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; 5 percent cobbles and 5 percent pebbles; moderately acid; clear wavy boundary.

E and Bt2—26 to 36 inches; 75 percent is light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist (E part); 25 percent is yellowish brown (10YR 5/4) coarse sandy loam lamellae  $\frac{1}{8}$ - to  $\frac{1}{4}$ -inch thick, dark yellowish brown (10YR 4/4) moist (B part); weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; slightly acid; gradual wavy boundary.

BC—36 to 60 inches; light yellowish brown (10YR 6/4) stony loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; 15 percent stones, 5 percent cobbles, and 5 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 39 to 44 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

#### E horizons

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Sandy loam or coarse sandy loam

Clay content: 5 to 10 percent

Content of rock fragments: 0 to 35 percent—0 to 35 percent boulders, stones, and cobbles; 0 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### E and Bt horizons

Hue: E part—10YR; B part—10YR or 2.5Y

Value: E part—6 or 7 dry, 4 or 5 moist; B part—4 or 5 dry, 4 or 5 moist

Chroma: E part—2 to 4; B part—3 or 4

Texture: Coarse sandy loam or sandy loam

Clay content: 5 to 10 percent; lamellae have less than 3 percent increase in clay

Content of rock fragments: 0 to 20 percent—0 to 15 percent boulders, stones, and cobbles; 5 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### BC horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Loamy coarse sand or coarse sandy loam

Clay content: 0 to 5 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent stones or cobbles; 5 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

### 80E—Elkner-Ovando complex, 15 to 35 percent slopes

#### Setting

##### Landform:

- Elkner—Mountains
- Ovando—Mountains

##### Slope:

- Elkner—15 to 35 percent
- Ovando—15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elkner and similar soils: 45 percent  
Ovando and similar soils: 40 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent  
Soils that are sandy below 7 inches: 0 to 5 percent  
Soils that are very gravelly below 10 inches: 0 to 5 percent

#### Major Component Description

##### Elkner

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

##### Ovando

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 80F—Elkner-Ovando complex, 35 to 60 percent slopes

#### Setting

##### Landform:

- Elkner—Mountains
- Ovando—Mountains

##### Slope:

- Elkner—35 to 60 percent
- Ovando—35 to 60 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elkner and similar soils: 45 percent  
Ovando and similar soils: 40 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent  
Soils that are sandy below 7 inches: 0 to 5 percent  
Soils that are very gravelly below 10 inches: 0 to 5 percent

#### Major Component Description

##### Elkner

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

##### Ovando

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Elliston Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*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:* 38 to 42 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.

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

A—0 to 7 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; strong medium granular structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine and few very coarse roots; many very fine and fine interstitial pores; moderately alkaline; clear smooth boundary.

Bw—7 to 12 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—12 to 44 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 and fine interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—44 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 pebbles; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 46 degrees F

*Moisture control section:* Between depths of 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

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 7.9 to 8.4

#### Bw horizon

Value: 3 or 4 moist; 5 or 6 dry

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 7.9 to 8.4

#### Bk horizon

Value: 4 or 5 moist; 6 or 7 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 10 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

#### 2C horizon

Value: 4 or 5 moist; 5 to 7 dry

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 pebbles

Reaction: 7.9 to 8.4

### 6B—Elliston loam, 0 to 4 percent slopes, rarely flooded

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Elliston and similar soils: 85 percent

##### Minor Components

Poorly drained soils: 0 to 5 percent

Soils that have a very gravelly subsoil: 0 to 4 percent

Soils that have a sandy subsoil: 0 to 3 percent

Soils that have slopes more than 4 percent: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forestland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Elve Series

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderately rapid

*Landform:* Mountains, hills, and moraines

*Parent material:* Colluvium derived from quartzite, argillite, and alpine till

*Slope range:* 4 to 80 percent

*Elevation range:* 4,400 to 7,500 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 35 to 38 degrees F

*Frost-free period:* 30 to 70 days

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

### 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.

Oe—2 to 0 inches; partially decomposed forest litter.

A—0 to 5 inches; light gray (10YR 7/2) gravelly loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 15 percent cobbles and 20 percent pebbles; moderately acid; clear wavy boundary.

E—5 to 16 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; many very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 15 percent cobbles and 35 percent pebbles; strongly acid; clear wavy boundary.

Bw1—16 to 26 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; common very fine and fine and few

coarse roots; many very fine and fine interstitial pores; 25 percent cobbles and 55 percent pebbles; slightly acid; clear wavy boundary.

Bw2—26 to 40 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 and 65 percent pebbles; slightly acid; clear wavy boundary.

BC—40 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 and 50 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 45 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Sandy loam or loam

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 60 percent—  
15 to 30 percent stones and cobbles; 20 to 30 percent pebbles

Reaction: pH 5.6 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: 5 to 25 percent

Content of rock fragments: 35 to 85 percent—0 to 25 percent stones; 10 to 40 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 5.1 to 7.3

#### 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 25 percent

Content of rock fragments: 60 to 85 percent—  
25 to 40 percent stones and cobbles; 25 to 55 percent pebbles

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: Sandy loam or loam  
 Clay content: 5 to 20 percent  
 Content of rock fragments: 60 to 85 percent—  
 20 to 40 percent stones and cobbles; 35 to  
 65 percent pebbles  
 Reaction: pH 5.1 to 6.5

**82D—Elve gravelly loam,  
4 to 15 percent slopes****Setting**

*Landform:* Hills  
*Slope:* 4 to 15 percent  
*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Elve and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Soils that are very gravelly below 10 inches: 0 to  
 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**82E—Elve gravelly loam,  
15 to 35 percent slopes****Setting**

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Elve and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Soils that are clayey below 12 inches: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**82F—Elve gravelly loam,  
35 to 60 percent slopes****Setting**

*Landform:* Hills  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Soils that are clayey below 12 inches: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 382D—Elve gravelly loam, warm, 8 to 15 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 8 to 15 percent

*Elevation:* 4,400 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent

Soils that have slopes more than 15 percent: 0 to 5 percent

Evavo soils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 382E—Elve gravelly loam, warm, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,400 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent

Soils that have slopes more than 35 percent: 0 to 5 percent

Evavo soils: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 382F—Elve gravelly loam, warm, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Soils that are moderately deep: 0 to 5 percent  
 Very gravelly sandy soils: 0 to 4 percent  
 Evaro soils: 0 to 3 percent  
 Soils that have slopes more than 60 percent: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 482E—Elve gravelly loam, dry, 15 to 35 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 482F—Elve gravelly loam, dry, 35 to 60 percent slopes

#### Setting

*Landform:* Hills  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Elve and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 682E—Elve bouldery sandy loam, 8 to 25 percent slopes

#### Setting

*Landform:* Moraines

*Slope:* 8 to 25 percent

*Elevation:* 4,400 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Elve and similar soils: 85 percent

##### Minor Components

Loberg soils: 0 to 8 percent

Very gravelly sandy soils: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Bouldery sandy loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 682F—Elve bouldery sandy loam, 25 to 50 percent slopes

#### Setting

*Landform:* Moraines

*Slope:* 25 to 50 percent

*Elevation:* 4,400 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Elve and similar soils: 85 percent

### Minor Components

Very gravelly sandy soils: 0 to 15 percent

#### Major Component Description

*Surface layer texture:* Bouldery sandy loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 982F—Elve-Rock outcrop complex, 35 to 60 percent slopes

#### Setting

*Landform:*

- Elve—Hills

- Rock outcrop—Hills

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Elve and similar soils: 50 percent

Rock outcrop: 35 percent

##### Minor Components

Soils that are moderately deep: 0 to 4 percent

Whitore soils: 0 to 4 percent

Tigeron soils: 0 to 4 percent

Evoro soils: 0 to 3 percent

#### Major Component Description

##### Elve

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Endoaquolls**

*Depth class:* Very deep

*Drainage class:* Poorly or very poorly drained

*Permeability:* Moderately slow, moderate, moderately rapid, or rapid

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,600 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Endoaquolls

**Representative Pedon**

Endoaquolls in an area of Fluvaquents-Endoaquolls complex, 0 to 2 percent slopes, occasionally flooded, in a woodland area, 500 feet south and 950 feet east of the northwest corner of sec. 32, T. 16 N., R. 12 W.

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

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

Bw—10 to 26 inches; dark grayish brown (10YR 5/2) loam, light brownish gray (10YR 6/2) dry; few fine distinct brownish yellow (10YR 6/8) redox concentrations; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine tubular pores; neutral; clear smooth boundary.

Cg—26 to 60 inches; light gray (N 7/) stratified very gravelly sandy loam and very gravelly loamy sand, light gray (5Y 7/1) dry; single grain; loose, slightly sticky, nonplastic; common very fine roots; few very fine interstitial pores; neutral.

**Range in Characteristics**

*Thickness of the mollic epipedon:* 7 to 15 inches

*Clay content:* 10 to 40 percent

*Rock fragments in the control section:* 0 to 70 percent

*Depth to the seasonal high water table:* 0 to 24 inches

**Evoro Series**

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderately rapid

*Landform:* Mountains

*Parent material:* Colluvium derived from argillite and quartzite

*Slope range:* 4 to 60 percent

*Elevation range:* 4,600 to 7,000 feet

*Annual precipitation:* 22 to 30 inches

*Annual air temperature:* 36 to 40 degrees F

*Frost-free period:* 30 to 70 days

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

**Typical Pedon**

Evoro 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.

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

A—0 to 6 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium and few coarse roots; many very fine and fine irregular pores; 5 percent cobbles and 25 percent pebbles; ash influenced with about 50 percent glass; moderately acid; clear smooth boundary.

2E—6 to 21 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; common very fine and fine and few medium and coarse roots; many very fine and fine irregular pores; 10 percent cobbles and 50 percent pebbles; slightly acid; gradual wavy boundary.

2E and Bt1—21 to 40 inches; 75 percent is very pale brown (10YR 7/3) extremely gravelly loam, pale brown (10YR 6/3) moist (E part); 25 percent is pale brown (10YR 6/3) extremely gravelly loam lamellae  $\frac{1}{16}$ - to  $\frac{1}{4}$ -inch thick, yellowish brown (10YR 5/4) moist (B part); 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 and 65 percent pebbles; neutral; gradual wavy boundary.

2E and Bt2—40 to 60 inches; 80 percent is very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) moist (E part); 20 percent is pale brown (10YR 6/3) extremely gravelly loam lamellae  $\frac{1}{16}$ - to  $\frac{1}{4}$ -inch thick, brown (10YR 5/3) moist (B part); 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 and 65 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 39 to 44 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

*Other features:* Moist bulk density is less than 0.95 g/cc to a depth of 6 inches or less and does not meet the thickness requirement for the vitrandic or andic intergrade.

#### A horizon

Hue: 10YR or 7.5YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Glass: 35 to 60 percent

Clay content: 7 to 15 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles

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 pebbles

Reaction: pH 5.6 to 7.3

#### 2E and Bt horizons

Hue: E part—10YR or 7.5YR; B part—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; lamellae have less than 3 percent clay increase

Content of rock fragments: 60 to 80 percent—5 to 15 percent cobbles; 55 to 65 percent pebbles

Reaction: pH 5.6 to 7.3

## 97D—Evaro gravelly loam, dry, 4 to 15 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 4 to 15 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 22 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Evaro and similar soils: 85 percent

#### Minor Components

Worock soils: 0 to 5 percent

Soils that have slopes more than 15 percent: 0 to 5 percent

Loberg soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 97E—Evaro gravelly loam, dry, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 22 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Evaro and similar soils: 85 percent

**Minor Components**

Worock soils: 0 to 4 percent  
 Soils that have slopes more than 35 percent: 0 to 3 percent  
 Loberg soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**97F—Evaro gravelly loam, dry, 35 to 60 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 22 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Evaro and similar soils: 85 percent

**Minor Components**

Worock soils: 0 to 4 percent  
 Soils that have slopes more than 60 percent: 0 to 3 percent  
 Loberg soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**197D—Evaro gravelly loam, 4 to 15 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 4 to 15 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 22 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Evaro and similar soils: 85 percent

**Minor Components**

Worock soils: 0 to 5 percent  
 Soils that have slopes more than 15 percent: 0 to 4 percent  
 Loberg soils: 0 to 4 percent  
 Soils that have a thick volcanic ash surface: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 197E—Evaro gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 22 to 30 inches  
*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Evaro and similar soils: 85 percent

##### Minor Components

Worock soils: 0 to 3 percent  
 Soils that have slopes more than 35 percent: 0 to 3 percent  
 Loberg soils: 0 to 3 percent  
 Soils that have a thick volcanic ash surface: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 197F—Evaro gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 22 to 30 inches  
*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Evaro and similar soils: 85 percent

##### Minor Components

Worock soils: 0 to 3 percent  
 Soils that have slopes more than 60 percent: 0 to 3 percent  
 Loberg soils: 0 to 3 percent  
 Soils that have a thick volcanic ash surface: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Fergus Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Moraines  
*Parent material:* Alpine till  
*Slope range:* 2 to 8 percent  
*Elevation range:* 3,800 to 4,400 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 40 to 45 degrees F  
*Frost-free period:* 70 to 90 days

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

#### Typical Pedon

Fergus clay loam, in an area of Fergus-Water complex, 2 to 8 percent slopes, in an area of cropland, 1,400 feet north and 650 feet west of the southeast corner of sec. 1, T. 13 N., R. 12 W.

Ap—0 to 4 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine and few medium roots; common very fine and fine continuous interstitial pores; neutral; abrupt smooth boundary.

**Bt1**—4 to 11 inches; reddish brown (5YR 5/3) clay, dark reddish brown (5YR 3/3) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; hard, very firm, very sticky, very plastic; few very fine, fine, and medium roots; common very fine and fine discontinuous irregular pores; many distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

**Bt2**—11 to 15 inches; reddish brown (5YR 5/3) clay loam, reddish brown (2.5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky, very plastic; few very fine and fine roots; common very fine and fine continuous irregular pores; many distinct clay films on faces of peds and lining pores; slightly alkaline; clear smooth boundary.

**Bt3**—15 to 21 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (2.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common very fine and few fine continuous irregular pores; few faint clay films on faces of peds; moderately alkaline; gradual smooth boundary.

**Btk**—21 to 36 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (2.5YR 5/4) moist; weak coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine and fine continuous irregular pores; few faint clay films on faces of peds; common very fine threads of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

**Bk**—36 to 60 inches; pink (5YR 7/3) clay loam, reddish brown (2.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine threads of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 12 inches

*Depth to the Bk horizon:* 20 to 36 inches

#### *Ap horizon*

Hue: 5YR, 7.5YR, or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bt1 horizon*

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bt2 horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 or 5 dry; 3 or 4 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: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bt3 horizon*

Hue: 2.5YR, 5YR, or 7.5YR

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: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

#### *Btk horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 2 to 4 or 6

Texture: Silty clay loam, clay loam, or clay

Clay content: 27 to 45 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### *Bk horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 2 to 4 or 6

Texture: Silty clay loam, clay loam, or clay

Clay content: 27 to 45 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 40C—Fergus-Water complex, 2 to 8 percent slopes

### Setting

*Landform:* Moraines  
*Slope:* 2 to 8 percent  
*Elevation:* 3,800 to 4,400 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Fergus and similar soils: 75 percent  
 Water: 10 percent

#### Minor Components

Soils that have very gravelly profiles: 0 to 5 percent  
 Soils that are somewhat poorly drained: 0 to 5 percent  
 Soils that have slopes more than 8 percent: 0 to 5 percent

### Major Component Description

#### Fergus

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.6 inches

#### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Fluvaquentic Endoaquolls

*Depth class:* Very deep  
*Drainage class:* Poorly drained  
*Permeability:* Rapid  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 4,600 to 5,200 feet  
*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F  
*Frost free period:* 90 to 105 days

**Taxonomic Class:** Fluvaquentic Endoaquolls

### Typical Pedon

Fluvaquentic Endoaquolls fine sandy loam, 0 to 2 percent slopes, in an area of Fluvaquentic Endoaquolls-Slickens complex, 0 to 2 percent slopes, severely impacted, 1,700 feet south and 1,200 feet west 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 pebbles; very strongly acid; abrupt smooth boundary.

Ab—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 pores; 1 percent pebbles; neutral; clear wavy boundary.

Abg—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; common very fine and fine and few medium and coarse roots; common very fine and few fine discontinuous irregular pores; 1 percent pebbles; disseminated lime; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Cb1—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 pebbles; slightly alkaline; abrupt wavy boundary.

Abg2—26 to 38 inches; very dark gray (2.5Y 3/1) silty clay loam, gray (2.5Y 5/1) dry; common coarse black (N 2.5/) redox depletions; massive; very hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine and few fine and medium discontinuous irregular pores; 1 percent pebbles; slightly alkaline; abrupt smooth boundary.

Cb2—38 to 60 inches; variegated colors brown (10YR 5/3) coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky, nonplastic; 1 percent pebbles; slightly alkaline.

### Range in Characteristics

*Depth to the Cb2 horizon:* 20 to 40 inches  
*Depth to the seasonal high water table:* 12 to 24 inches

### 104A—Fluvaquentic Endoaquolls-Slickens complex, 0 to 2 percent slopes, severely impacted

#### Setting

*Landform:*

- Fluvaquentic Endoaquolls—Flood plains
- Slickens—Flood plains

*Slope:*

- Fluvaquentic Endoaquolls—0 to 2 percent
- Slickens—0 to 2 percent

*Elevation:* 4,600 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Fluvaquentic Endoaquolls and similar soils:  
75 percent

Slickens: 10 percent

##### Minor Components

Somewhat poorly drained soils: 0 to 10 percent

Areas of riverwash: 0 to 5 percent

#### Major Component Description

##### Fluvaquentic Endoaquolls

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

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

##### Slickens

*Definition:* Material from ore mills, commonly freshly ground rock that has undergone chemical treatment during the milling process

*Flooding:* Occasional

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Fluvaquents

*Depth class:* Very deep

*Drainage class:* Poorly and very poorly drained

*Permeability:* Moderate, moderately slow, moderately rapid, or rapid

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,600 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

#### Representative Pedon

Fluvaquents, in an area of Fluvaquents-Endoaquolls complex, 0 to 2 percent slopes, occasionally flooded, in a woodland area, 1,200 feet south and 1,000 feet east of the northwest corner of sec. 32, T. 16 N., R. 12 W.

Oi—2.5 inches to 0; partially decomposed forest litter.

E—0 to 5 inches; light reddish brown (5YR 6/3) loamy sand, reddish brown (5YR 5/3) moist; weak fine and medium subangular blocky structure; loose, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; many very fine tubular pores; moderately acid; gradual smooth boundary.

C1—5 to 10 inches; pink (5YR 7/3) loamy sand, reddish brown (5YR 5/3) moist; few fine distinct brownish yellow (10YR 6/8) redox concentrations; single grain; loose, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; many very fine tubular pores; moderately acid; clear wavy boundary.

C2—10 to 60 inches; pink (5YR 7/3) extremely gravelly sand, reddish brown (5YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine irregular pores; 10 percent cobbles and 60 percent pebbles; slightly acid.

### Range in Characteristics

*Clay content:* 5 to 40 percent

*Rock fragments in the control section:* 0 to 80 percent

*Depth to the seasonal high water table:* 0 to 24 inches

### 7—Fluvaquents-Endoaquolls complex, 0 to 2 percent slopes, occasionally flooded

#### Setting

*Landform:*

- Fluvaquents—Flood plains
- Endoaquolls—Flood plains

*Slope:*

- Fluvaquents—0 to 2 percent
- Endoaquolls—0 to 2 percent

*Elevation:* 3,600 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Fluvaquents and similar soils: 45 percent

Endoaquolls and similar soils: 40 percent

##### Minor Components

Somewhat poorly drained soils: 0 to 5 percent

Areas of open water: 0 to 5 percent

Areas of riverwash: 0 to 5 percent

#### Major Component Description

##### Fluvaquents

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

*Dominant parent material:* Alluvium

*Native plant cover type:* Forestland

*Flooding:* Occasional

*Water table:* Apparent

##### Endoaquolls

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

*Dominant parent material:* Alluvium

*Native plant cover type:* Forestland

*Flooding:* Occasional

*Water table:* Apparent

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Gregson Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate to the 2C horizon, rapid below

*Landform:* Outwash plains and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,000 to 5,200 feet

*Annual precipitation:* 10 to 19 inches

*Annual air temperature:* 39 to 44 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, 400 feet south and 2,200 feet east of the northwest corner of sec. 16, T. 6 N., R. 9 W.

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

A—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; strong fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly alkaline; clear smooth boundary.

Bw1—8 to 18 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine pores; neutral; clear smooth boundary.

Bw2—18 to 22 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; few fine faint strong brown (7.5YR 4/6) redox concentrations; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine pores; neutral; clear smooth boundary.

2C—22 to 60 inches; light gray (10YR 7/1) very gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; common very fine pores; 10 percent cobbles and 40 percent pebbles; neutral.

#### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 14 inches

*Depth to the seasonal high water table:* 24 to 42 inches

*Depth to sand and gravel:* 20 to 40 inches

*A horizon*

Value: 2 or 3 moist; 3 to 5 dry

Chroma: 1 or 2

Clay content: 18 to 27 percent

Reaction: pH 6.6 to 7.8

*Bw horizons*

Value: 4 to 6 moist; 6 or 7 dry

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Reaction: pH 6.6 to 7.8

*2C horizon*

Value: 5 or 6 moist; 6 or 7 dry

Chroma: 1 or 2

Texture: Loamy sand or sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent pebbles

Reaction: pH 6.6 to 7.8

**434—Gregson loam, cool, 0 to 4 percent slopes, rarely flooded**

**Setting**

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Gregson and similar soils: 85 percent

**Minor Components**

Very gravelly sandy soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Soils that have a cobbly loam surface: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**444—Gregson loam, 0 to 4 percent slopes, rarely flooded**

**Setting**

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**

Gregson and similar soils: 85 percent

**Minor Components**

Very gravelly sandy soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Gregson very cobbly loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**534—Gregson loam, cool, 0 to 4 percent slopes**

**Setting**

*Landform:* Outwash plains

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Gregson and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly below 10 inches: 0 to 8 percent

Poorly drained soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 544—Gregson loam, 0 to 4 percent slopes

### Setting

*Landform:* Outwash plains  
*Slope:* 0 to 4 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Gregson and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly below 10 inches: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Soils that have a cobbly loam surface: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Helmville Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Mountains  
*Parent material:* Colluvium from limestone and argillite  
*Slope range:* 8 to 60 percent  
*Elevation range:* 4,600 to 7,500 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 35 to 38 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, 350 feet south and 2,300 feet west of the northeast corner of sec. 5, T. 11 N., R. 11 W.

Oi—2 inches to 0; partly decomposed organic matter.  
 E—0 to 5 inches; pinkish gray (7.5YR 6/2) cobbly loam, brown (7.5YR 4/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine interstitial pores; 10 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 13 inches; light brown (7.5YR 6/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; strong coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine and common medium and coarse roots; common distinct clay films on faces of pedis; 15 percent cobbles and 35 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 22 inches; light yellowish brown (10YR 6/4) very gravelly 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 and few medium and coarse roots; common very fine and fine interstitial pores; common distinct clay films on faces of peds; 15 percent cobbles and 40 percent pebbles; strongly effervescent; slightly alkaline; gradual wavy boundary.

Bk—22 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and medium roots; few very fine interstitial pores; 15 percent cobbles and 45 percent pebbles; disseminated lime; violently effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 37 to 42 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to accumulation of carbonates:* 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

Rock fragments, flat or subrounded: 15 to 35 percent—0 to 20 percent stones, flagstones, and cobbles; 5 to 30 percent pebbles or channers

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

Rock fragments, flat or subrounded: 30 to 60 percent—10 to 35 percent stones and cobbles; 15 to 50 percent pebbles or channers

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

Rock fragments, flat or subrounded: 35 to 60 percent—10 to 35 percent stones and cobbles; 15 to 50 percent pebbles or channers

Reaction: pH 6.1 to 7.8

#### *Bk horizon*

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Loam, sandy loam, or clay loam

Clay content: 18 to 30 percent

Rock fragments, flat or subrounded: 40 to

90 percent—15 to 45 percent stones and

cobbles; 20 to 45 percent pebbles or channers

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

## 84D—Helmville cobbly loam, 8 to 15 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 8 to 15 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Helmville and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Danaher soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 84E—Helmville cobbly loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Helmville and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Danaher soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 84F—Helmville cobbly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Helmville and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 15 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 184E—Helmville cobbly loam, moist, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Helmville and similar soils: 85 percent

#### Minor Components

Relyea soils: 0 to 5 percent

Soils that have slopes more than 35 percent: 0 to 5 percent

Danaher soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 184F—Helmville cobbly loam, moist, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Helmville and similar soils: 85 percent

#### Minor Components

Relyea soils: 0 to 5 percent  
 Soils that have slopes more than 60 percent: 0 to 5 percent  
 Danaher soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Hoyt Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Colluvium derived from igneous rock and till  
*Slope range:* 8 to 35 percent  
*Elevation range:* 4,400 to 6,200 feet  
*Annual precipitation:* 18 to 24 inches  
*Annual air temperature:* 39 to 45 degrees F  
*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Hoyt loam, 15 to 35 percent slopes, in an area of woodland, 2,800 feet south and 1,500 feet east of the northwest corner of sec. 2, T. 10 N., R. 11 W.

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

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; common very fine irregular pores; neutral; clear smooth boundary.

A2—6 to 12 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine tubular pores; common skeletal of light brownish gray (10YR 6/2) unstained sand and silt grains; 15 percent pebbles; neutral; clear wavy boundary.

Bt1—12 to 23 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common fine and medium roots; many very fine tubular pores; common faint clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

Bt2—23 to 37 inches; light olive brown (2.5Y 5/4) gravelly sandy clay loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and few medium roots; many very fine tubular pores; common distinct clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear wavy boundary.

BC—37 to 60 inches; yellowish brown (2.5Y 5/4) gravelly coarse sandy loam, olive brown (2.5Y 4/4) moist; massive; soft, friable, slightly sticky, nonplastic; few fine and medium roots; common very fine irregular pores; 5 percent cobbles and 15 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; the soils are frozen in the moisture control section and deeper from approximately November through the end of March; they are moist in some or all parts of the moisture control section from April through mid July

*Other features:* The surface, when mixed to 7 inches, has mollic colors but does not meet the thickness requirements for a mollic epipedon.

#### A1 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—0 to 5 percent cobbles; 0 to 10 percent pebbles  
Reaction: pH 6.6 to 7.8

*A2 horizon*

Value: 2 to 4 moist  
Chroma: 2 or 3  
Clay content: 10 to 27 percent  
Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles  
Reaction: pH 6.6 to 7.8

*Bt1 horizon*

Hue: 2.5Y, 10YR, or 7.5YR  
Value: 4 to 6 dry; 3 or 4 moist  
Chroma: 3 or 4  
Texture: Clay loam, sandy clay loam, or loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
Reaction: pH 6.6 to 7.8

*Bt2 horizon*

Hue: 2.5Y, 10YR, or 7.5YR  
Value: 4 or 5 dry; 3 or 4 moist  
Texture: Clay loam, sandy clay loam, or loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
Reaction: pH 6.6 to 7.8

*BC horizon*

Hue: 2.5Y or 10YR  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 2 to 4  
Texture: Coarse loamy sand, coarse sandy 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 pebbles  
Reaction: pH 6.6 to 7.8

**452D—Hoyt loam, 8 to 15 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Hoyt and similar soils: 85 percent

**Minor Components**

Yreka soils: 0 to 8 percent  
Soils that have slopes more than 15 percent: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 8.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**452E—Hoyt loam, 15 to 35 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Hoyt and similar soils: 85 percent

**Minor Components**

Yreka soils: 0 to 8 percent  
Soils that have slopes more than 35 percent: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Kleinschmidt Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landform:* Alluvial fans and 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 44 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.

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, moderately plastic; many very fine and fine and few medium roots; many very fine and fine pores; 25 percent pebbles; 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 structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine and few medium roots; many very fine and fine pores; 5 percent cobbles and 30 percent pebbles; 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 pores; 5 percent cobbles and 40 percent pebbles; 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; common very fine, many fine, and few coarse roots; many very fine and fine pores; 10 percent cobbles and 40 percent pebbles; few thin lime casts on underside 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 and 35 percent pebbles; disseminated lime; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 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: 2 or 3 moist; 3 to 5 dry

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 pebbles

Reaction: pH 6.6 to 7.8

#### A horizon

Hue: 10YR or 7.5YR

Value: 2 to 4 moist; 4 or 5 dry

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 pebbles

Reaction: pH 6.6 to 7.8

#### Bw horizons

Value: 2 to 5 moist; 4 to 7 dry

Chroma: 2 to 4

Texture: Loam, sandy loam, or silty clay loam

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent pebbles

Reaction: pH 6.6 to 8.4

#### 2Bk horizon

Hue: 10YR or 7.5YR

Value: 3 to 5 moist; 5 to 7 dry

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  
 pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

### **547—Kleinschmidt gravelly loam, cool, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Kleinschmidt and similar soils: 85 percent

##### **Minor Components**

Poorly drained soils: 0 to 5 percent  
 Soils that have a calcareous surface: 0 to 5 percent  
 Soils that have a saline surface: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **557—Kleinschmidt gravelly loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### **Composition**

##### **Major Components**

Kleinschmidt and similar soils: 85 percent

##### **Minor Components**

Poorly drained soils: 0 to 5 percent  
 Soils that have a calcareous surface: 0 to 5 percent  
 Soils that have a saline surface: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Lap Series**

*Depth class:* Shallow  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Material derived from limestone  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,000 to 5,800 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid  
 Lithic Calcicustolls

#### **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.

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; many very fine, fine, and medium and common coarse roots; many very fine interstitial pores; 5 percent stones, 10 percent cobbles, and 20 percent pebbles; slightly effervescent; slightly 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; many very fine, fine, and medium and common coarse roots; many very fine interstitial pores; 5 percent stones, 5 percent cobbles, and 15 percent pebbles; 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; common very fine, fine, and medium and few coarse roots; common very fine interstitial pores; 5 percent stones, 15 percent cobbles, and 35 percent pebbles; 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, and 30 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

R—18 inches; fractured limestone bedrock.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 9 inches

*Depth to the R horizon:* 10 to 20 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 35 percent—5 to 15 percent stones and cobbles; 10 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 70 percent—0 to 30 percent stones, flagstones, and cobbles; 30 to 55 percent pebbles or channers

Calcium carbonate equivalent: 30 to 45 percent in the less than 2 mm particle-size fraction and more than 40 percent in the less than 20 mm soil particle-size fraction

Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 50 to 70 percent—25 to 35 percent stones, flagstones, and cobbles; 35 to 60 percent pebbles or channers

Calcium carbonate equivalent: 30 to 45 percent in the less than 2 mm particle-size fraction and more than 40 percent in the less than 20 mm soil particle-size fraction

Reaction: pH 7.9 to 8.4

### Libeg Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains and hills

*Parent material:* Colluvium and material weathered from igneous rocks

*Slope range:* 8 to 60 percent

*Elevation range:* 5,700 to 7,500 feet

*Annual precipitation:* 18 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

Libeg gravelly loam, in an area of Libeg-Monad-Copenhaver complex, 8 to 15 percent slopes, in an area of rangeland, 1,300 feet north and 900 feet west of the southeast corner of sec. 4, T. 8 N., R. 8 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; strong fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine irregular pores;

5 percent cobbles and 15 percent pebbles; slightly acid; clear smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/6) very gravelly loam, dark yellowish brown (10YR 4/6) moist; moderate fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine irregular pores; common faint clay films on faces of pedis; 15 percent cobbles and 45 percent pebbles; slightly acid; gradual wavy boundary.

Bt2—14 to 60 inches; yellowish brown (10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/6) moist; moderate fine subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and fine irregular pores; common faint clay films on faces of pedis; 20 percent cobbles and 40 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 36 to 44 degrees F

*Thickness of the mollic epipedon:* 8 to 16 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4 or 6

Texture: Loam, sandy loam, or clay loam

Clay content: 15 to 35 percent

Content of rock fragments: 35 to 80 percent—5 to 50 percent stones and cobbles; 10 to 45 percent pebbles

Reaction: pH 5.6 to 7.3

### 54D—Libeg gravelly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 8 to 15 percent

*Elevation:* 5,700 to 7,500 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Shallow soils that are near rock areas: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that are moderately deep: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 54E—Libeg gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 5,700 to 7,500 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Shallow soils that are near rock areas: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that are moderately deep: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 854D—Libeg-Monad-Copenhaver complex, 8 to 15 percent slopes

### Setting

*Landform:*

- Libeg—Hills
- Monad—Hills
- Copenhaver—Hills

*Slope:*

- Libeg—8 to 15 percent
- Monad—8 to 15 percent
- Copenhaver—8 to 15 percent

*Elevation:* 5,700 to 7,500 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 40 percent

Monad and similar soils: 25 percent

Copenhaver and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent

Soils that have a very cobbly surface: 0 to 4 percent

Roy soils: 0 to 4 percent

Soils that have slopes more than 15 percent: 0 to 3 percent

### Major Component Description

#### Libeg

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

#### Monad

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

#### Copenhaver

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 854E—Libeg-Monad-Copenhaver complex, 15 to 35 percent slopes

### Setting

*Landform:*

- Libeg—Hills
- Monad—Hills
- Copenhaver—Hills

*Slope:*

- Libeg—15 to 35 percent
- Monad—15 to 35 percent
- Copenhaver—15 to 35 percent

*Elevation:* 5,700 to 7,500 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 40 percent

Monad and similar soils: 25 percent

Copenhaver and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent

Libeg very cobbly loam: 0 to 4 percent

Roy soils: 0 to 4 percent  
Soils that have slopes more than 35 percent: 0 to 3 percent

### Major Component Description

#### Libeg

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### Monad

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

#### Copenhaver

*Surface layer texture:* Gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 854F—Libeg-Monad-Copenhaver complex, 35 to 60 percent slopes

### Setting

#### *Landform:*

- Libeg—Hills
- Monad—Hills
- Copenhaver—Hills

#### *Slope:*

- Libeg—35 to 60 percent
- Monad—35 to 50 percent
- Copenhaver—35 to 60 percent

*Elevation:* 5,700 to 7,500 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 40 percent  
Monad and similar soils: 25 percent  
Copenhaver and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent  
Soils that have a very cobbly surface: 0 to 4 percent  
Roy soils: 0 to 4 percent  
Soils that have slopes more than 60 percent: 0 to 3 percent

### Major Component Description

#### Libeg

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### Monad

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

#### Copenhaver

*Surface layer texture:* Gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Loberg Series***Depth class:* Very deep*Drainage class:* Well drained*Permeability:* Slow*Landform:* Hills and mountains*Parent material:* Colluvium and material weathered from igneous rocks*Slope range:* 4 to 60 percent*Elevation range:* 4,600 to 7,500 feet*Annual precipitation:* 18 to 30 inches*Annual air temperature:* 35 to 38 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, 1,700 feet south and 1,600 feet west of the northeast corner of sec. 33, T. 9 N., R. 11 W.

Oi—3 inches to 0; partially decomposed forest litter.

E—0 to 5 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 15 percent pebbles; moderately acid; clear wavy boundary.

E/Bt—5 to 11 inches; 80 percent is light brownish gray (10YR 6/2) very cobbly clay loam, dark grayish brown (10YR 4/2) moist tongues (E part); 20 percent is pale brown (10YR 6/3) very cobbly clay loam, brown (10YR 5/3) moist (B part); weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, moderately plastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 20 percent cobbles and 30 percent pebbles; slightly acid; clear wavy boundary.

Bt1—11 to 19 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, moderately plastic; common very fine, fine, and medium and few coarse roots; common very fine pores; continuous faint clay films on faces of peds; 5 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

Bt2—19 to 36 inches; light brownish gray (2.5Y 6/2) very gravelly clay loam, grayish brown (2.5Y 5/2) moist; strong coarse angular blocky structure;

hard, firm, moderately sticky and moderately plastic; common very fine, fine, and medium and few coarse roots; common very fine pores; continuous faint clay films on faces of peds; 5 percent cobbles and 40 percent pebbles; neutral; clear smooth boundary.

Bt3—36 to 47 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; strong coarse angular blocky structure; very hard, very firm, moderately sticky and moderately plastic; common very fine and fine and few medium roots; common very fine pores; continuous faint clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; slightly alkaline; clear smooth boundary.

BC—47 to 60 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; strong coarse angular blocky structure; very hard, very firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine pores; 5 percent cobbles and 40 percent pebbles; slightly alkaline.

**Range in Characteristics**

*Soil temperature:* 36 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*E horizon*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 5.1 to 6.5

*E/Bt horizon*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: E part—5 to 7 dry, 3 to 5 moist; B part—4 to 6 dry, 3 to 5 moist

Chroma: 2 or 3

Clay content: 35 to 50 percent

Content of rock fragments: 20 to 60 percent—15 to 45 percent stones and cobbles; 10 to 40 percent pebbles

Reaction: pH 5.1 to 7.8

*Bt horizons*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Sandy clay, clay, or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 60 percent—0 to 45 percent stones and cobbles; 20 to 40 percent pebbles

Reaction: pH 5.1 to 7.8

*BC horizon*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Sandy clay, clay, or clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 35 to 60 percent—5 to 45 percent stones and cobbles; 20 to 40 percent pebbles

Reaction: pH 7.4 to 8.4

**85D—Loberg gravelly loam,  
4 to 15 percent slopes**

**Setting**

*Landform:* Hills

*Slope:* 4 to 15 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 18 to 30 inches

*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 85 percent

**Minor Components**

Danaher soils: 0 to 6 percent

Worock soils: 0 to 6 percent

Poorly drained soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**85E—Loberg gravelly loam,  
15 to 35 percent slopes**

**Setting**

*Landform:* Hills

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 18 to 30 inches

*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 85 percent

**Minor Components**

Danaher soils: 0 to 5 percent

Worock soils: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Poorly drained soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**385D—Loberg gravelly loam, moist,  
4 to 15 percent slopes**

**Setting**

*Landform:* Hills

*Slope:* 4 to 15 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 18 to 30 inches

*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 3 percent  
 Soils that are calcareous at 10 inches: 0 to 3 percent  
 Poorly drained soils: 0 to 3 percent  
 Danaher soils: 0 to 3 percent  
 Soils that are moderately deep: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**385E—Loberg gravelly loam, moist, 15 to 35 percent slopes****Setting**

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 4,600 to 7,500 feet  
*Mean annual precipitation:* 18 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Loberg and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 4 percent  
 Soils that are moderately deep: 0 to 4 percent  
 Soils that have slopes more than 35 percent: 0 to 4 percent  
 Poorly drained soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Marcott Series**

*Depth class:* Very deep  
*Drainage class:* Somewhat poorly drained  
*Permeability:* Slow  
*Landform:* Stream terraces  
*Parent material:* Clayey alluvium  
*Slope range:* 0 to 4 percent  
*Elevation range:* 4,400 to 5,200 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

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

**Typical Pedon**

Marcott silty clay loam, 0 to 4 percent slopes, in an area of hayland, 100 feet south and 900 feet east of the northwest corner of sec. 29, T. 12 N., R. 9 W.

Oi—1 inch to 0; slightly decomposed grass litter.  
 Az—0 to 10 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; strong medium and coarse angular blocky structure; hard, firm, moderately sticky and moderately plastic; many fine and medium roots; common very fine tubular pores; few medium seams of salt; moderately alkaline; clear wavy boundary.  
 Bz—10 to 15 inches; grayish brown (10YR 5/2) silty clay loam, very dark gray (10YR 3/1) moist; weak coarse prismatic structure parting to strong fine and medium angular blocky; hard, firm, very sticky and very plastic; common fine and medium roots; common very fine tubular pores; many medium seams of salt; moderately alkaline; clear wavy boundary.  
 Bkz1—15 to 20 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; many medium seams and masses of salt and lime;

slightly effervescent; moderately alkaline; clear wavy boundary.

**Bkz2**—20 to 24 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; common fine and medium prominent brownish yellow (10YR 6/6) redox concentrations; weak fine subangular blocky structure; hard, firm, very sticky and moderately plastic; 10 percent pebbles; many masses of salt and lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**Bkzg1**—24 to 37 inches; light gray (2.5Y 7/2) silty clay, dark grayish brown (2.5Y 4/2) moist; common fine and medium prominent brownish yellow (10YR 6/6) redox concentrations; weak fine subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many medium seams of salt and lime; strongly effervescent; very strongly alkaline; gradual smooth boundary.

**Bkzg2**—37 to 50 inches; gray (N 6/) silty clay, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common large seams and masses of salt and lime; slightly effervescent; very strongly alkaline; clear smooth boundary.

**Akzb**—50 to 60 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; hard, firm, moderately sticky and very plastic; common large seams of salt and lime; slightly effervescent; very strongly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 15 inches

*Depth to the Bkz horizon:* 12 to 24 inches

*Depth to the seasonal water table:* 24 to 42 inches

*Other features:* Some pedons do not have a Akzb horizon. Some pedons have a 2C horizon at depths greater than 36 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 pebbles

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 20

Reaction: pH 6.6 to 8.4

#### *Bz horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 1 to 3

Texture: Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 25

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

#### *Bkz and Akzb horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 1 to 3

Texture: Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 30

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 9.0

## 549—Marcott silty clay loam, 0 to 4 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,400 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Marcott and similar soils: 85 percent

#### Minor Components

Gregson soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Carten soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Silty clay loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Martinsdale Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 35 percent

*Elevation range:* 3,800 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 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, 1,450 feet north and 2,350 feet east of the southwest corner of sec. 22, T. 8 N., R. 10 W.

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; many very fine and fine and common medium 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; many very fine and fine and few coarse 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 pebbles; 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 pebbles; 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 pebbles; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; moist in all or some parts from April through mid July and September through mid November

*Thickness of the mollic epipedon:* 7 to 16 inches and includes all or part of the Bt horizon

*Depth to the Bk horizon:* 11 to 30 inches

*Soil phases:* Gravelly

#### 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 pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 7.5YR or 10YR

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 15 percent pebbles

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: 20 to 35 percent  
 Calcium carbonate equivalent: 15 to 35 percent  
 Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles  
 Reaction: pH 7.4 to 8.4

### **52B—Martinsdale loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Martinsdale and similar soils: 85 percent

##### **Minor Components**

Martinsdale gravelly loam soils: 0 to 5 percent  
 Soils that have slopes more than 4 percent: 0 to 5 percent  
 Soils that are very gravelly below 10 inches: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **52C—Martinsdale loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans  
*Slope:* 4 to 8 percent

*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Martinsdale and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 8 percent: 0 to 5 percent  
 Martinsdale cobbly loam: 0 to 5 percent  
 Soils that are very gravelly below 10 inches: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **52D—Martinsdale loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Martinsdale and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 15 percent: 0 to 5 percent  
 Martinsdale cobbly loam: 0 to 5 percent  
 Soils that are very gravelly throughout: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 352B—Martinsdale cobbly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Martinsdale and similar soils: 85 percent

##### Minor Components

Soils that have slopes more than 4 percent: 0 to 5 percent  
 Martinsdale very gravelly loam: 0 to 5 percent  
 Danvers soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 352E—Martinsdale cobbly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Martinsdale and similar soils: 85 percent

##### Minor Components

Soils that slopes more than 35 percent: 0 to 5 percent  
 Soils that are calcareous throughout: 0 to 5 percent  
 Martinsdale very gravelly loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Mccabe Series

*Depth class:* Very deep  
*Drainage class:* Poorly drained  
*Permeability:* Moderately rapid  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 4,000 to 4,100 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 90 to 105 days

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Aeric Fluvaquents

### Typical Pedon

Mccabe loam, in an area of Mccabe-Canarway complex, 0 to 2 percent slopes, occasionally flooded, in an area of pasture, 2,350 feet south and 100 feet east of the northwest corner of sec. 22, T. 11 N., R. 15 W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; common fine tubular pores; neutral; clear smooth boundary.

C1—2 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine interstitial pores; slightly alkaline; clear smooth boundary.

C2—4 to 9 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; slightly alkaline; gradual wavy boundary.

C3—9 to 16 inches; dark grayish brown (10YR 4/2) sandy loam consisting of strata of loam, fine sandy loam and sandy loam, grayish brown (10YR 5/2) dry; many medium distinct yellowish brown (10YR 5/8), brownish yellow (10YR 6/8) dry redox concentrations; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine and fine roots; few fine tubular pores; slightly alkaline; clear wavy boundary.

C4—16 to 36 inches; dark grayish brown (10YR 4/2) fine sandy loam consisting of strata of loam and fine sandy loam, grayish brown (10YR 5/2) dry; many medium distinct yellowish brown (10YR 5/8), brownish yellow (10YR 6/8) dry redox concentrations; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; few fine tubular pores; slightly alkaline; clear wavy boundary.

2C5—36 to 60 inches; very dark grayish brown (10YR 3/2) very gravelly loamy sand, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; few fine tubular pores; 20 percent cobbles and 35 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

*Depth to the seasonal high water table:* 12 to 24 inches

#### A horizon

Value: 3 to 5 moist; 5 or 6 dry

Chroma: 1 or 2

Clay content: 5 to 15 percent

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 7.8

#### C1 and C2 horizons

Value: 3 to 6 moist; 5 to 7 dry

Chroma: 1 or 2

Texture: Loam, sandy loam, or fine sandy loam

Clay content: 10 to 18 percent, with less than 50 percent fine sand and coarser

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 8.4

#### C3 and C4 horizons

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1 to 3

Redox concentrations: Hue—10YR or 2.5YR;

Value—4 or 5 moist; 5 or 6 dry; Chroma—4, 5, 6, or 8

Texture: Loam, very fine sandy loam, fine sandy loam, or sandy loam

Clay content: 5 to 18 percent, with less than 50 percent fine sand and coarser

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

#### 2C5 horizon

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1 or 2

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 60 percent—15 to 25 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 7.8

### 10A—Mccabe-Canarway complex, impacted, 0 to 2 percent slopes, occasionally flooded

#### Setting

##### Landform:

- Mccabe—Flood plains
- Canarway—Flood plains

##### Slope:

- Mccabe—0 to 2 percent
- Canarway—0 to 2 percent

*Elevation:* 4,000 to 4,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Mccabe and similar soils: 45 percent

Canarway and similar soils: 40 percent

#### Minor Components

Very poorly drained soils: 0 to 5 percent

Areas of open water: 0 to 5 percent

Areas of riverwash: 0 to 5 percent

### Major Component Description

#### Mccabe

*Surface layer texture:* Sandy loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 6.1 inches

#### Canarway

*Surface layer texture:* Gravelly sandy loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 11A—Mccabe-Canarway complex, 0 to 2 percent slopes, occasionally flooded

### Setting

*Landform:*

- Mccabe—Flood plains
- Canarway—Flood plains

*Slope:*

- Mccabe—0 to 2 percent
- Canarway—0 to 2 percent

*Elevation:* 4,000 to 4,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Mccabe and similar soils: 45 percent

Canarway and similar soils: 40 percent

#### Minor Components

Very poorly drained soils: 0 to 5 percent

Areas of open water: 0 to 5 percent

Areas of riverwash: 0 to 5 percent

### Major Component Description

#### Mccabe

*Surface layer texture:* Sandy loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 6.1 inches

#### Canarway

*Surface layer texture:* Gravelly sandy loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## M-W—Miscellaneous Water

### Composition

#### Major Components

Miscellaneous water: 100 percent

### Major Component Description

*Definition:* Areas of open water in sewage lagoons, industrial waste pits, fish hatcheries, etc.

### Mocmont Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Mountains

*Parent material:* Colluvium derived from quartzite and argillite

*Slope range:* 15 to 60 percent

*Elevation range:* 3,800 to 6,500 feet

*Annual precipitation:* 18 to 26 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Mocmont very gravelly loam, 15 to 35 percent slopes, in an area of woodland, 2,700 feet north and 200 feet west of the southeast corner of sec. 36, T. 14 N., R. 10 W.

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

E1—0 to 5 inches; grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine discontinuous irregular pores; 40 percent pebbles; neutral; clear smooth boundary.

E2—5 to 9 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine discontinuous irregular pores; 5 percent cobbles and 40 percent pebbles; slightly acid; gradual wavy boundary.

E/Bt—9 to 18 inches; 75 percent is light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist (E part); 25 percent is pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist (B part); moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and few fine roots; common very fine and fine discontinuous irregular pores; 10 percent cobbles and 35 percent pebbles; slightly acid; gradual wavy boundary.

Bt—18 to 26 inches; pale brown (10YR 6/3) extremely gravelly loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and few fine roots; common very fine and fine discontinuous irregular pores;

common distinct clay films on faces of peds and on pebbles; 20 percent cobbles and 45 percent pebbles; moderately acid; gradual wavy boundary.

BC—26 to 60 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and few fine roots; common very fine and fine discontinuous irregular pores; 25 percent cobbles and 50 percent pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 42 to 45 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the argillic horizon:* 10 to 24 inches

#### E horizons

Hue: 7.5YR or 10YR

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 or 3

Clay content: 15 to 20 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent angular cobbles; 35 to 50 percent angular pebbles or channers

Reaction: pH 5.6 to 7.3

#### E/Bt horizon

Hue: 7.5YR or 10YR

Value: E part—6 or 7 dry, 4 or 5 moist; B part—5 to 7 dry, 4 or 5 moist

Chroma: 2 to 4

Texture: E part—sandy loam or loam; B part—loam or clay loam

Clay content: E part—10 to 20 percent; B part—25 to 35 percent

Content of rock fragments: 35 to 60 percent—10 to 30 percent angular cobbles; 25 to 55 percent angular pebbles or channers

Reaction: pH 5.6 to 7.3

#### Bt horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Loam, clay loam, or sandy clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 35 to 85 percent—10 to 30 percent angular cobbles; 25 to 55 percent angular pebbles or channers

Reaction: pH 5.6 to 7.3

#### BC horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6  
 Texture: Loam or sandy loam  
 Clay content: 10 to 25 percent  
 Content of rock fragments: 60 to 90 percent—  
 25 to 40 percent stones and cobbles; 35 to  
 50 percent angular pebbles or channers  
 Reaction: pH 5.6 to 7.3

### **90F—Mocmont very gravelly loam, moist, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 6,500 feet  
*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Mocmont and similar soils: 85 percent

##### **Minor Components**

Yreka soils: 0 to 15 percent

#### **Major Component Description**

*Surface layer texture:* Very gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **190E—Mocmont very gravelly loam, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 6,500 feet  
*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Mocmont and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 35 percent: 0 to 5 percent  
 Soils that have a calcareous subsoil: 0 to 5 percent  
 Rumblecreek soils: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Very gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **190F—Mocmont very gravelly loam, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 6,500 feet  
*Mean annual precipitation:* 18 to 26 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Mocmont and similar soils: 85 percent

##### **Minor Components**

Areas of rock outcrop: 0 to 4 percent  
 Soils that have a calcareous subsoil: 0 to 4 percent  
 Rumblecreek soils: 0 to 4 percent  
 Soils that are moderately deep: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Very gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Mollet Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains, alluvial fans, and stream terraces

*Parent material:* Alluvium and colluvium from fine-grained extrusive igneous rocks

*Slope range:* 4 to 35 percent

*Elevation range:* 5,400 to 7,000 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 Ustic Argicryolls

### Typical Pedon

Mollet loam, 4 to 15 percent slopes, in an area of rangeland, 1,100 feet south and 800 feet east of the northwest corner of sec. 11, T. 10 N., R. 6 W.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine, common fine, and few medium roots; many very fine and fine irregular pores; 5 percent pebbles; moderately acid; clear wavy boundary.

A2—7 to 12 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; hard, friable, nonsticky, nonplastic; many very fine, common fine, and few medium roots; few very fine and fine tubular pores; 10 percent pebbles; moderately acid; abrupt wavy boundary.

Bt1—12 to 16 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and few fine and medium roots; common very fine and fine tubular pores; common distinct clay films on

faces of peds; 10 percent pebbles; moderately acid; abrupt smooth boundary.

Bt2—16 to 29 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; common very fine and few fine and medium roots; common very fine and few fine and medium irregular pores; common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; moderately acid; abrupt wavy boundary.

Bt3—29 to 60 inches; light yellowish brown (10YR 6/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine and fine roots; common very fine and few fine and medium tubular pores; few faint clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 10 to 16 inches

#### A horizons

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 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### Bt1 horizon

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 5.6 to 6.5

#### Bt2 horizon

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 5.6 to 6.5

#### Bt3 horizon

Texture: Clay loam or clay

Chroma: 4 or 6

Clay content: 35 to 45 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent pebbles  
Reaction: pH 5.6 to 7.3

#### 48D—Mollet loam, 4 to 15 percent slopes

##### Setting

*Landform:* Alluvial fans  
*Slope:* 4 to 15 percent  
*Elevation:* 5,400 to 7,000 feet  
*Mean annual precipitation:* 15 to 22 inches  
*Frost-free period:* 30 to 70 days

##### Composition

###### Major Components

Mollet and similar soils: 85 percent

###### Minor Components

Soils that are very gravelly throughout: 0 to 10 percent  
Soils that have slopes more than 15 percent: 0 to 5 percent

##### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

##### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### 48E—Mollet loam, 15 to 35 percent slopes

##### Setting

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent  
*Elevation:* 5,400 to 7,000 feet  
*Mean annual precipitation:* 15 to 22 inches  
*Frost-free period:* 30 to 70 days

##### Composition

###### Major Components

Mollet and similar soils: 85 percent

###### Minor Components

Soils that are very gravelly throughout: 0 to 10 percent  
Soils that have slopes more than 35 percent: 0 to 5 percent

##### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

##### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

##### Monad Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Hills  
*Parent material:* Material derived from fine-grained extrusive igneous rocks and colluvium  
*Slope range:* 2 to 50 percent  
*Elevation range:* 5,400 to 7,500 feet  
*Annual precipitation:* 18 to 22 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, 2 to 8 percent slopes, in an area of rangeland, 1,800 feet south and 2,500 feet west of the northeast corner of sec. 15, T. 8 N., R. 8 W.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine and fine pores; slightly acid; clear smooth boundary.

Bt1—11 to 25 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; very hard, firm,

slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; few faint clay films on faces of peds; 15 percent pebbles; slightly acid; gradual wavy boundary.

Bt2—25 to 60 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine and fine roots; many very fine and fine pores; few faint clay films on faces of peds; 30 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 36 to 41 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 10 to 16 inches

*Other features:* The Monad soil is a taxadjunct to the series. It classifies as fine-loamy, mixed, superactive Typic Argicryolls. It does not meet the requirements of Alfic Argicryolls but has similar use and management.

#### 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 pebbles

Reaction: pH 5.6 to 7.3

#### Bt horizons

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam, loam, or sandy clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 15 to 35 percent pebbles

Reaction: pH 5.6 to 7.8

## 50C—Monad loam, 2 to 8 percent slopes

### Setting

*Landform:* Hills

*Slope:* 2 to 8 percent

*Elevation:* 5,400 to 6,800 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Monad and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly throughout: 0 to 8 percent

Soils that have a clayey subsoil: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 50D—Monad loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills

*Slope:* 8 to 15 percent

*Elevation:* 5,400 to 6,800 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Monad and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly throughout: 0 to 8 percent

Soils that have a clayey subsoil: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 50E—Monad loam, 15 to 35 percent slopes

### Setting

*Landform:* Hills

*Slope:* 15 to 35 percent

*Elevation:* 5,400 to 6,800 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Monad and similar soils: 85 percent

#### Minor Components

Soils that are moderately deep to deep: 0 to 5 percent

Soils that are very gravelly throughout: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Ovando Series

*Depth class:* Very deep

*Drainage class:* Excessively drained

*Permeability:* Rapid

*Landform:* Mountains

*Parent material:* Granitic colluvium

*Slope range:* 15 to 60 percent

*Elevation range:* 4,600 to 7,000 feet

*Annual precipitation:* 24 to 30 inches

*Annual air temperature:* 35 to 38 degrees F

*Frost-free period:* 30 to 70 days

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

### Typical Pedon

Ovando very stony sandy loam, in an area of Elkner-Ovando complex, 15 to 35 percent slopes, in an area of woodland, 1,400 feet south and 2,300 feet west of the northeast corner of sec. 30, T. 13 N., R. 13 W.

Oi—3 to 0 inches; undecomposed and slightly decomposed forest litter.

E1—0 to 5 inches; pale brown (10YR 6/3) very stony sandy loam, grayish brown (10YR 5/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; common very fine and fine pores; 20 percent stones, 10 percent cobbles, and 10 percent pebbles; slightly acid; clear wavy boundary.

E2—5 to 16 inches; light gray (10YR 7/2) very stony loamy coarse sand, grayish brown (10YR 5/2) moist; weak fine granular structure; loose, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; common very fine and fine pores; 10 percent stones, 20 percent cobbles, and 20 percent pebbles; moderately acid; clear wavy boundary.

E and Bt—16 to 34 inches; 85 percent is pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 5/3) moist (E part); 15 percent is brown (10YR 5/3) sandy loam lamellae  $\frac{1}{8}$ - to  $\frac{1}{4}$ -inch thick, dark brown (10YR 4/3) moist (B part); single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; 10 percent stones, 10 percent cobbles, and 35 percent pebbles; slightly acid; gradual smooth boundary.

C—34 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and coarse roots; 10 percent stones, 15 percent cobbles, and 45 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 37 to 44 degrees F

*Moisture control section:* Between depths of 12 and 35 inches; not dry in any part for as long as 90 consecutive days

*E1 horizon*

Value: 6 or 7 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 5 to 10 percent  
 Content of rock fragments: 35 to 80 percent—  
 25 to 35 percent boulders, stones, and  
 cobbles; 10 to 45 percent pebbles  
 Reaction: pH 5.6 to 6.5

*E2 horizon*

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 4 or 5 moist  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 15 to 80 percent—0 to  
 40 percent boulders, stones, and cobbles; 5 to  
 45 percent pebbles  
 Reaction: pH 5.6 to 6.5

*E and Bt horizon*

Hue: E part—10YR or 2.5Y; B part—10YR or  
 2.5Y  
 Value: E part—6 or 7 dry, 4 or 5 moist; B part—  
 4 or 5 dry, 4 or 5 moist  
 Chroma: E part—2 to 4; B part—3 or 4  
 Clay content: 0 to 5 percent; lamellae have less  
 than 3 percent clay increase  
 Content of rock fragments: 35 to 60 percent—0 to  
 40 percent stones or cobbles; 10 to 50 percent  
 pebbles  
 Reaction: pH 5.6 to 6.5

*C horizon*

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 60 to 80 percent—5 to  
 40 percent stones and cobbles; 20 to 60  
 percent pebbles  
 Reaction: pH 5.6 to 6.5

**180F—Ovando-Elkner complex,  
 35 to 60 percent slopes**

**Setting***Landform:*

- Ovando—Mountains
- Elkner—Mountains

*Slope:*

- Ovando—35 to 60 percent
- Elkner—35 to 60 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Ovando and similar soils: 50 percent  
 Elkner and similar soils: 35 percent

**Minor Components**

Areas of rock outcrop: 0 to 5 percent  
 Areas of rubble land: 0 to 5 percent  
 Soils that have bouldery surface layers: 0 to 5 percent

**Major Component Description****Ovando**

*Surface layer texture:* Very stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

**Elkner**

*Surface layer texture:* Stony sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**780E—Ovando-Elkner-Rock outcrop  
 complex, 15 to 35 percent slopes**

**Setting***Landform:*

- Ovando—Mountains
- Elkner—Mountains
- Rock outcrop—Mountains

*Slope:*

- Ovando—15 to 35 percent
- Elkner—15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 30 to 70 days

## Composition

### Major Components

Ovando and similar soils: 40 percent  
 Elkner and similar soils: 25 percent  
 Rock outcrop: 20 percent

### Minor Components

Yreka soils: 0 to 5 percent  
 Soils that are shallow to bedrock: 0 to 5 percent  
 Soils that have slopes more than 35 percent: 0 to 5 percent

### Major Component Description

#### Ovando

*Surface layer texture:* Extremely bouldery sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

#### Elkner

*Surface layer texture:* Bouldery sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 780F—Ovando-Elkner-Rock outcrop complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Ovando—Mountains
- Elkner—Mountains
- Rock outcrop—Mountains

##### *Slope:*

- Ovando—35 to 60 percent
- Elkner—35 to 60 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 24 to 30 inches

*Frost-free period:* 30 to 70 days

## Composition

### Major Components

Ovando and similar soils: 40 percent  
 Elkner and similar soils: 25 percent  
 Rock outcrop: 20 percent

### Minor Components

Yreka soils: 0 to 8 percent  
 Soils that are shallow to bedrock: 0 to 7 percent

### Major Component Description

#### Ovando

*Surface layer texture:* Extremely bouldery sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Granitic colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

#### Elkner

*Surface layer texture:* Bouldery sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Perma Series

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderate to BC horizon, moderately rapid below

*Landform:* Alluvial fans, stream terraces, moraines, and mountains

*Parent material:* Alluvium, colluvium, and glacial outwash

*Slope range:* 0 to 60 percent  
*Elevation range:* 3,800 to 5,000 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Perma gravelly loam, 0 to 4 percent slopes, in an area of irrigated hayland, 1,320 feet north and 800 feet east of the southwest corner of sec. 28, T. 15 N., R. 11 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine irregular pores; 20 percent pebbles; neutral; abrupt smooth boundary.

A—5 to 10 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, nonsticky, slightly plastic; many very fine and fine and few medium roots; many very fine and fine irregular pores; 20 percent pebbles; neutral; gradual wavy boundary.

Bw1—10 to 17 inches; yellowish brown (10YR 5/4) very gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; common fine tubular and irregular pores; 40 percent pebbles; neutral; gradual wavy boundary.

Bw2—17 to 32 inches; dark yellowish brown (10YR 4/4) very gravelly loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; many fine irregular pores; 5 percent stones, 15 percent cobbles, and 35 percent pebbles; neutral; gradual wavy boundary.

BC—32 to 60 inches; dark yellowish brown (10YR 4/4) extremely gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; many fine irregular pores; 5 percent stones, 15 percent cobbles, and 50 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 44 to 47 degrees F  
*Moisture control section:* Between depths of 8 and 24 inches  
*Thickness of the mollic epipedon:* 10 to 15 inches  
*Depth to extremely gravelly material:* 30 to 38 inches

#### A horizons

Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 7 to 27 percent  
 Content of rock fragments: 15 to 60 percent—0 to 30 percent boulders, stones, and cobbles; 10 to 50 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### Bw horizons

Hue: 10YR or 7.5YR  
 Value: 4 to 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Loam or sandy loam  
 Clay content: 7 to 27 percent  
 Content of rock fragments: 35 to 85 percent—0 to 50 percent stones and cobbles; 25 to 65 percent pebbles  
 Reaction: pH 6.6 to 7.8

#### BC horizon

Hue: 10YR or 7.5YR  
 Value: 4, 6, or 7 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Loam, loamy sand, or sandy loam  
 Clay content: 0 to 15 percent  
 Content of rock fragments: 60 to 85 percent—10 to 50 percent stones and cobbles; 50 to 65 percent pebbles  
 Reaction: pH 6.6 to 7.8

### 41B—Perma gravelly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

#### Major Components

Perma and similar soils: 85 percent

**Minor Components**

Perma cobbly loam: 0 to 5 percent  
 Soils that have very gravelly clay subsoils: 0 to 5 percent  
 Soils that are loamy to 32 inches: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**41C—Perma gravelly loam, 4 to 8 percent slopes****Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Perma and similar soils: 85 percent

**Minor Components**

Perma stony loam: 0 to 8 percent  
 Soils that are very gravelly at 10 inches: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**41D—Perma gravelly loam, 8 to 15 percent slopes****Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Perma and similar soils: 85 percent

**Minor Components**

Soils that are very gravelly at 10 inches: 0 to 8 percent  
 Soils that are very gravelly throughout: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**41E—Perma gravelly loam, 15 to 35 percent slopes****Setting**

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent

*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Soils that are loamy throughout: 0 to 5 percent  
 Soils that have very gravelly clay subsoils: 0 to 4 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Shallow soils that are near rock areas: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 41F—Perma gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 10 percent  
 Shallow soils that are near rock areas: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 241B—Perma stony loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Soils that are calcareous throughout: 0 to 8 percent  
 Soils that are loamy sand below 10 inches: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 241C—Perma stony loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Perma and similar soils: 85 percent

##### Minor Components

Soils that are calcareous throughout: 0 to 8 percent  
Soils that are loamy sand below 10 inches: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 241D—Perma stony loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

##### Major Components

Perma and similar soils: 85 percent

##### Minor Components

Soils that are calcareous throughout: 0 to 8 percent  
Soils that are loamy sand below 10 inches: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 241E—Perma stony loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Perma and similar soils: 85 percent

##### Minor Components

Soils that are calcareous throughout: 0 to 10 percent  
Soils that are loamy sand below 10 inches: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 338C—Perma cobbly loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent

Soils that have slopes more than 8 percent: 0 to 5 percent

Soils that are calcareous at 10 inches: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 338D—Perma cobbly loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent

Soils that have slopes more than 8 percent: 0 to 5 percent

Soils that are calcareous at 10 inches: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 338E—Perma cobbly loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent  
Soils that have slopes more than 8 percent: 0 to 4 percent  
Soils that are calcareous at 10 inches: 0 to 3 percent  
Soils that have a very cobbly surface: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 338F—Perma cobbly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent  
Soils that have slopes more than 8 percent: 0 to 4 percent  
Soils that are calcareous at 10 inches: 0 to 3 percent  
Soils that have a very cobbly surface: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 542E—Perma very bouldery loam, 8 to 25 percent slopes

#### Setting

*Landform:* Moraines  
*Slope:* 8 to 25 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Shawmut soils: 0 to 6 percent  
Soils that have slopes more than 25 percent: 0 to 6 percent  
Areas of open water: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Very bouldery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Glacial outwash  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 542F—Perma very bouldery loam, 25 to 50 percent slopes

#### Setting

*Landform:* Moraines

*Slope:* 25 to 50 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Perma and similar soils: 85 percent

##### Minor Components

Shawmut soils: 0 to 6 percent

Soils that have slopes more than 50 percent: 0 to 6 percent

Areas of open water: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Very bouldery loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Glacial outwash

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 642E—Perma extremely bouldery loam, 8 to 50 percent slopes

#### Setting

*Landform:* Moraines

*Slope:* 8 to 50 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Perma and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 5 percent

Straw soils: 0 to 5 percent

Poorly drained soils: 0 to 3 percent

Areas of open water: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Extremely bouldery loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Glacial outwash

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 838E—Perma-Whitlash-Rock outcrop complex, 15 to 35 percent slopes

#### Setting

*Landform:*

- Perma—Mountains
- Whitlash—Mountains
- Rock outcrop—Mountains

*Slope:*

- Perma—15 to 35 percent
- Whitlash—15 to 35 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Perma and similar soils: 50 percent

Whitlash and similar soils: 20 percent

Rock outcrop: 15 percent

##### Minor Components

Soils that have slopes more than 60 percent: 0 to 15 percent

### Major Component Description

#### Perma

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

#### Whitlash

*Surface layer texture:* Very stony loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous residuum  
*Flooding:* None  
*Available water capacity:* Mainly 1.3 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 838F—Perma-Whitlash-Rock outcrop complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Perma—Mountains
- Whitlash—Mountains
- Rock outcrop—Mountains

##### *Slope:*

- Perma—35 to 60 percent
- Whitlash—35 to 60 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Perma and similar soils: 50 percent  
 Whitlash and similar soils: 20 percent  
 Rock outcrop: 15 percent

##### Minor Components

Soils that have slopes more than 60 percent: 0 to 15 percent

### Major Component Description

#### Perma

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.2 inches

#### Whitlash

*Surface layer texture:* Very stony loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.3 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 102—Pits, gravel

#### Composition

##### Major Components

Pits, gravel: 85 percent

##### Minor Components

Areas of soils that support vegetation: 0 to 15 percent

#### Major Component Description

*Definition:* Areas mined as a source of sand and gravel, supporting little or no vegetation

*Flooding:* None

#### Poronto Series

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Landform:* Flood plains and 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 44 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.

Oi—3 inches to 0; slightly decomposed organic matter.

A—0 to 10 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 and slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bg1—10 to 16 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 pebbles; slightly alkaline; gradual wavy boundary.

Bg2—16 to 28 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 pebbles; neutral; gradual wavy boundary.

Bg3—28 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 pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 46 degrees F  
*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 10 to 16 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: 0 to 2  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.8

### Bg1 horizon

Hue: 5YR, 7.5YR, 10YR, 2.5Y, or 5Y  
 Value: 3 or 4 moist; 4 to 7 dry  
 Chroma: 1 to 3  
 Texture: Loam, clay loam, sandy clay loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles  
 Reaction: pH 6.6 to 7.8

### Bg2 horizon

Hue: 5YR, 7.5YR, 10YR, 2.5Y, or 5Y  
 Value: 3 to 5 moist; 5 to 7 dry  
 Chroma: 1 to 3  
 Texture: Clay loam, sandy clay loam, or loam  
 Clay content: 18 to 35 percent  
 Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles; 35 to 40 percent pebbles  
 Reaction: pH 6.6 to 7.8

### Bg3 horizon

Hue: 5YR, 7.5YR, 10YR, 2.5Y, or 5Y  
 Value: 3 to 5 moist; 4 to 7 dry  
 Chroma: 1 or 2  
 Texture: Sandy loam or sandy clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent pebbles  
 Reaction: pH 6.6 to 7.3

## 637—Poronto loam, 0 to 4 percent slopes

### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 105 days

## Composition

### Major Components

Poronto and similar soils: 85 percent

### Minor Components

Very poorly drained soils: 0 to 3 percent  
 Blossberg soils: 0 to 3 percent  
 Soils that are gravelly in upper layers: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 3 percent  
 Kleinschmidt soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 837—Poronto loam, 0 to 4 percent slopes, rarely flooded

### Setting

*Landform:* Flood plains  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 105 days

### Composition

#### Major Components

Poronto and similar soils: 85 percent

#### Minor Components

Very gravelly sandy soils: 0 to 4 percent  
 Blossberg soils: 0 to 4 percent  
 Very poorly drained soils: 0 to 4 percent  
 Kleinschmidt soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* 80  
*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Quigley Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Alluvial fans, stream terraces, and moraines  
*Parent material:* Calcareous alluvium and alpine till  
*Slope range:* 0 to 25 percent  
*Elevation range:* 3,800 to 5,800 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 38 to 44 degrees F  
*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Quigley loam, 0 to 4 percent slopes, in an area of rangeland, 100 feet south and 350 feet west of the northeast corner of sec. 35, T. 7 N., R. 9 W.

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 structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine and fine tubular pores; 5 percent pebbles; 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 and moderately plastic; many fine roots; many very fine and fine tubular pores; 5 percent pebbles; 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; common fine irregular and few fine tubular pores; 5 percent pebbles; 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 and 10 percent pebbles; disseminated lime; continuous faint coatings of lime 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; many very fine and fine irregular and common fine tubular pores; 5 percent cobbles and 15 percent pebbles; disseminated lime; continuous faint coatings of lime 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 and 20 percent pebbles; disseminated lime; continuous faint coatings of lime on undersides of rock fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 15 inches (includes the Bw horizon)

*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: 20 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bw horizon

Value: 4 or 5 dry; 3 moist

Texture: Loam or clay loam

Clay content: 18 to 33 percent

Content of rock fragments: 5 to 35 percent—0 to 20 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bk1 horizon

Value: 6 or 7 dry; 5 moist

Chroma: 3

Texture: Loam or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 20 percent cobbles; 5 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Value: 7 or 8 dry; 6 or 7 moist

Chroma: 1 to 3

Texture: Loam or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 10 to 35 percent—5 to 20 percent cobbles; 5 to 15 percent pebbles

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: 2 to 4

Texture: Loam, clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 10 to 35 percent—5 to 20 percent cobbles; 5 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

#### 2Bk4 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 30 to 50 percent—15 to 25 percent cobbles; 15 to 25 percent pebbles

Calcium carbonate equivalent: 10 to 20 percent

Reaction: pH 7.9 to 9.0

## 60B—Quigley loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Quigley and similar soils: 85 percent

**Minor Components**

Soils that slopes more than 4 percent: 0 to 4 percent  
 Soils that are very gravelly throughout: 0 to 4 percent  
 Soils that have a calcareous surface layer: 0 to 4 percent

Quigley gravelly loam: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**60C—Quigley loam, 4 to 8 percent slopes****Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Quigley and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 8 percent: 0 to 4 percent  
 Soils that are very gravelly throughout: 0 to 4 percent  
 Soils that have a calcareous surface layer: 0 to 4 percent  
 Soils that have a gravelly, cobbly surface: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**60D—Quigley loam, 8 to 15 percent slopes****Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Quigley and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 15 percent: 0 to 4 percent  
 Soils that are very gravelly throughout: 0 to 4 percent  
 Soils that have a calcareous surface layer: 0 to 4 percent  
 Soils that have a gravelly, cobbly surface: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 63C—Quigley-Straw-Water complex, 2 to 8 percent slopes

#### Setting

##### *Landform:*

- Quigley—Moraines
- Straw—Drainageways

##### *Slope:*

- Quigley—2 to 8 percent
- Straw—2 to 8 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Quigley and similar soils: 55 percent

Straw and similar soils: 20 percent

Water: 10 percent

##### Minor Components

Soils that have silt loam below 8 inches: 0 to 15 percent

#### Major Component Description

##### Quigley

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.1 inches

##### Straw

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

##### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 63E—Quigley-Straw-Water complex, 8 to 25 percent slopes

#### Setting

##### *Landform:*

- Quigley—Moraines
- Straw—Drainageways

##### *Slope:*

- Quigley—8 to 25 percent
- Straw—8 to 25 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Quigley and similar soils: 55 percent

Straw and similar soils: 20 percent

Water: 10 percent

##### Minor Components

Soils that are very gravelly throughout: 0 to 15 percent

#### Major Component Description

##### Quigley

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.1 inches

##### Straw

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

##### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 460C—Quigley cobbly loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Quigley and similar soils: 85 percent

#### Minor Components

Shawmut soils: 0 to 8 percent

Winspect soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Redchief Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains and hills

*Parent material:* Colluvium derived from igneous bedrock

*Slope range:* 4 to 60 percent

*Elevation range:* 5,000 to 8,600 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 34 to 39 degrees F

*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, smectitic Ustic Argicryolls

### Typical Pedon

Redchief gravelly loam, in an area of Redchief-Copenhaver gravelly loams, 8 to 15 percent slopes, in an area of rangeland, 1,900 feet north and 50 feet west of the southeast corner of sec. 3, T. 10 N., R. 6 W.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 5 percent cobbles and 20 percent pebbles; moderately acid; clear wavy boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky, moderately plastic; common very fine and fine and few medium and coarse roots; many very fine, fine, and medium interstitial pores; many faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; slightly acid; clear wavy boundary.

Bt2—18 to 28 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine and fine roots; common very fine and fine interstitial pores; many faint clay films on faces of peds; 20 percent cobbles and 35 percent pebbles; neutral; gradual wavy boundary.

Bt3—28 to 60 inches; pale brown (10YR 6/3) extremely gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine and fine roots; few very fine and fine interstitial pores; many faint clay films on faces of peds; 20 percent cobbles and 45 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 45 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 10 to 16 inches

#### A horizon

Hue: 10YR or 7.5YR

Value: 2 to 4 dry; 2 or 3 moist

Chroma: 2 or 3  
 Clay content: 20 to 27 percent  
 Content of rock fragments: 15 to 35 percent—0 to 25 percent stones and cobbles; 15 to 25 percent pebbles  
 Reaction: pH 5.1 to 6.0

**Bt1 horizon**

Hue: 5YR, 7.5YR, or 10YR  
 Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 3, 4, 6, or 8  
 Texture: Clay loam or clay  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 25 to 60 percent—0 to 20 percent stones and cobbles; 25 to 50 percent pebbles  
 Reaction: pH 5.1 to 6.0

**Bt2 horizon**

Hue: 5YR, 7.5YR, or 10YR  
 Value: 4 to 6 dry; 4 or 5 moist  
 Chroma: 4, 6, or 8  
 Texture: Clay loam or clay  
 Clay content: 35 to 60 percent  
 Content of rock fragments: 35 to 70 percent—5 to 20 percent stones and cobbles; 30 to 50 percent pebbles  
 Reaction: pH 5.1 to 7.3

**Bt3 horizon**

Hue: 5YR, 7.5YR, or 10YR  
 Value: 4 to 6 dry; 4 or 5 moist  
 Chroma: 3, 4, 6, or 8  
 Clay content: 40 to 60 percent  
 Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles; 30 to 60 percent pebbles  
 Reaction: pH 5.1 to 7.3

### **45D—Redchief cobbly loam, 4 to 15 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 4 to 15 percent  
*Elevation:* 5,000 to 8,600 feet  
*Mean annual precipitation:* 19 to 22 inches  
*Frost-free period:* 30 to 70 days

#### **Composition**

#### **Major Components**

Redchief and similar soils: 85 percent

#### **Minor Components**

Soils that are moderately deep to deep: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **45E—Redchief cobbly loam, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,000 to 8,600 feet  
*Mean annual precipitation:* 19 to 22 inches  
*Frost-free period:* 30 to 70 days

#### **Composition**

#### **Major Components**

Redchief and similar soils: 85 percent

#### **Minor Components**

Soils that are moderately deep to deep: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Igneous colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 845D—Redchief-Copenhaver gravelly loams, 8 to 15 percent slopes

### Setting

*Landform:*

- Redchief—Hills
- Copenhaver—Hills

*Slope:*

- Redchief—8 to 15 percent
- Copenhaver—8 to 15 percent

*Elevation:* 5,000 to 8,600 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Redchief and similar soils: 65 percent

Copenhaver and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Soils that have slopes more than 15 percent: 0 to 7 percent

### Major Component Description

#### Redchief

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

#### Copenhaver

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 845E—Redchief-Copenhaver gravelly loams, 15 to 35 percent slopes

### Setting

*Landform:*

- Redchief—Hills
- Copenhaver—Hills

*Slope:*

- Redchief—15 to 35 percent
- Copenhaver—15 to 35 percent

*Elevation:* 5,000 to 8,600 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Redchief and similar soils: 65 percent

Copenhaver and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Soils that have slopes more than 35 percent: 0 to 7 percent

### Major Component Description

#### Redchief

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

#### Copenhaver

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Material weathered from igneous rocks

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Relyea Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Colluvium derived from limestone and calcareous argillite

*Slope range:* 15 to 60 percent

*Elevation range:* 4,600 to 7,500 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 35 to 38 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.

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

E—0 to 3 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 structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine discontinuous irregular and few very fine discontinuous tubular pores; 5 percent cobbles and 25 percent pebbles; slightly acid; clear smooth boundary.

Bt/E—3 to 6 inches; 80 percent is reddish brown (5YR 4/4) very gravelly clay loam, dark reddish gray (5YR 4/2) moist (B part); 20 percent is light reddish brown (5YR 6/3) very gravelly loam, reddish brown (5YR 4/3) moist tongues (E part); 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; 10 percent cobbles and 30 percent pebbles; slightly acid; clear smooth boundary.

Bt—6 to 15 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; many medium and common very fine, fine, and coarse roots; many very fine and fine discontinuous irregular and many very fine discontinuous tubular pores; many distinct clay films on faces of peds; 10 percent cobbles and 30 percent pebbles; neutral; clear wavy boundary.

Btk—15 to 28 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; common very fine, fine, and medium and few coarse roots; many very fine and fine discontinuous irregular pores; few faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; disseminated lime; continuous faint and distinct lime casts on underside of coarse fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk1—28 to 36 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 structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and medium and few very fine discontinuous irregular pores; 20 percent cobbles and 45 percent pebbles; disseminated lime; continuous faint and distinct lime casts surrounding coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—36 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 and 40 percent pebbles; disseminated lime; continuous faint and distinct lime casts surrounding coarse fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 37 to 40 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the Bk horizon:* 13 to 35 inches

*E horizon*

Hue: 5YR, 7.5YR, or 10YR  
 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 stones and cobbles; 15 to 25 percent pebbles  
 Reaction: pH 6.1 to 7.3

*Bt/E horizon*

Hue: 5YR, 7.5YR, or 10YR  
 Value: B part—4 or 5 dry, 3 or 4 moist; E part—5 or 6 dry, 4 or 5 moist  
 Chroma: B part—2 to 4 or 6; E part—2 or 3  
 Texture, mixed: Clay loam or silty clay loam  
 Clay content, mixed: 27 to 35 percent  
 Content of rock fragments: 15 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent pebbles  
 Reaction: pH 6.1 to 7.3

*Bt horizon*

Hue: 5YR, 7.5YR, or 10YR  
 Value: 4 or 5 dry; 3 or 4 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 stones and cobbles; 30 to 40 percent pebbles  
 Reaction: pH 6.1 to 7.3

*Btk horizon*

Hue: 7.5YR or 10YR  
 Value: 5 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 stones and cobbles; 25 to 40 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 8.4

*Bk1 horizon*

Hue: 7.5YR or 10YR  
 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 stones and cobbles; 25 to 45 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Reaction: pH 7.9 to 8.4

*Bk2 horizon*

Hue: 7.5YR or 10YR  
 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—20 to 35 percent stones and cobbles; 35 to 45 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Reaction: pH 7.9 to 8.4

## **185E—Relyea-Helmville complex, 15 to 35 percent slopes**

### **Setting**

*Landform:*

- Relyea—Mountains
- Helmville—Mountains

*Slope:*

- Relyea—15 to 35 percent
- Helmville—15 to 35 percent

*Elevation:* 4,600 to 7,000 feet*Mean annual precipitation:* 20 to 30 inches*Frost-free period:* 30 to 70 days

### **Composition**

**Major Components**

Relyea and similar soils: 55 percent  
 Helmville and similar soils: 30 percent

**Minor Components**

Danaher soils: 0 to 10 percent  
 Areas of rock outcrop: 0 to 5 percent

### **Major Component Description**

**Relyea**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

**Helmville**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 185F—Relyea-Helmville complex, 35 to 60 percent slopes

### Setting

#### *Landform:*

- Relyea—Mountains
- Helmville—Mountains

#### *Slope:*

- Relyea—35 to 60 percent
- Helmville—35 to 60 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Relyea and similar soils: 55 percent

Helmville and similar soils: 30 percent

#### Minor Components

Danaher soils: 0 to 10 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

#### Relyea

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

#### Helmville

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 485E—Relyea-Helmville complex, moist, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Relyea—Mountains
- Helmville—Mountains

#### *Slope:*

- Relyea—15 to 35 percent
- Helmville—15 to 35 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Relyea and similar soils: 55 percent

Helmville and similar soils: 30 percent

#### Minor Components

Danaher soils: 0 to 8 percent

Soils that have slopes more than 35 percent: 0 to 7 percent

### Major Component Description

#### Relyea

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

#### Helmville

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 485F—Relyea-Helmville complex, moist, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Relyea—Mountains
- Helmville—Mountains

##### *Slope:*

- Relyea—35 to 60 percent
- Helmville—35 to 60 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Relyea and similar soils: 55 percent

Helmville and similar soils: 30 percent

##### Minor Components

Danaher soils: 0 to 8 percent

Soils that have slopes more than 60 percent: 0 to 7 percent

#### Major Component Description

##### Relyea

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

##### Helmville

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Rittel Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains

*Parent material:* Material derived from semiconsolidated shale

*Slope range:* 15 to 35 percent

*Elevation range:* 4,400 to 6,500 feet

*Annual precipitation:* 18 to 25 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid  
Typic Haplustalfs

#### Typical Pedon

Rittel loam, 15 to 35 percent slopes, in an area of woodland, 2,150 feet north and 2,400 feet east of the southwest corner of sec. 23, T. 11 N., R. 11 W.

- E1—0 to 6 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many very fine discontinuous irregular pores; slightly acid; clear smooth boundary.
- E2—6 to 13 inches; light brownish gray (2.5Y 7/2) loam, dark grayish brown (2.5Y 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many very fine discontinuous irregular pores; neutral; clear smooth boundary.
- E/Bt—13 to 19 inches; 70 percent is light brownish gray (2.5Y 7/2) clay loam, very dark grayish brown (2.5Y 5/3) moist (E part); 30 percent is brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist (B part); moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; many fine, medium, and coarse roots; common medium tubular pores; neutral; clear wavy boundary.
- Bt—19 to 27 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable,

moderately sticky and moderately plastic; common fine and medium roots; common medium tubular pores; common faint clay films on faces of peds; neutral; clear wavy boundary.

Cr—27 to 60 inches; light brownish gray (2.5Y 6/2) fractured shale, dark grayish brown (2.5Y 4/2) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* The Rittel soil is a taxadjunct to the series. It classifies as fine-loamy, mixed, superactive, frigid Typic Haplustalfs. It does not meet the clay requirements of the fine family but has similar use and management.

#### E horizons

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 10 percent cobbles; 0 to 10 percent angular pebbles

Reaction: pH 5.6 to 7.3

#### E/Bt horizon

Hue: 10YR, 7.5YR, or 2.5YR

Value: E part—6 or 7 dry, 4 or 5 moist; B part—5 or 6 dry, 4 or 5 moist

Chroma: 2 to 4

Texture: Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 20 percent pebbles

Reaction: pH 5.6 to 7.3

#### Bt horizon

Hue: 10YR, 7.5YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Reaction: pH 5.6 to 7.3

## 91E—Rittel loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Rittel and similar soils: 85 percent

#### Minor Components

Very gravelly clayey soils: 0 to 5 percent

Soils that are shallow to shale: 0 to 5 percent

Soils that have slopes more than 35 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Rochester Series

*Depth class:* Very deep

*Drainage class:* Excessively drained

*Permeability:* Rapid

*Landform:* Mountains

*Parent material:* Granitic colluvium

*Slope range:* 4 to 60 percent

*Elevation range:* 4,500 to 5,500 feet

*Annual precipitation:* 18 to 25 inches

*Annual air temperature:* 38 to 42 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, cool, 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.

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

A—0 to 3 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, and 15 percent pebbles; neutral; clear smooth boundary.

- C1—3 to 16 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; common medium and few very fine and fine roots; few very fine discontinuous interstitial pores; 40 percent stones and 10 percent cobbles; slightly acid; gradual smooth boundary.
- C2—16 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 and 15 percent cobbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 12 and 35 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 to 3

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 60 percent—  
20 to 30 percent boulders, stones, and  
cobbles; 15 to 30 percent pebbles

Rock fragments, surface cover: 0 to 3.0 percent  
stones or boulders

Reaction: pH 6.6 to 7.3

#### C1 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture: Loamy sand, loamy coarse sand, sandy  
loam, coarse sandy loam, or coarse sand  
(50 percent or more of the sand fraction is  
medium sand and coarser)

Clay content: 0 to 10 percent

Content of rock fragments: 15 to 80 percent—5 to  
50 percent boulders, stones, and cobbles;  
10 to 30 percent pebbles

Reaction: pH 5.6 to 7.3

#### C2 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture: Loamy sand, loamy coarse sand, sand,  
or coarse sand (50 percent or more of the  
sand fraction is medium sand and coarser)

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to  
40 percent boulders, stones, and cobbles;  
20 to 60 percent pebbles

Reaction: pH 6.1 to 7.8

### Roy Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains, hills, alluvial fans, and stream  
terraces

*Parent material:* Alluvium and colluvium derived from  
volcanic rock

*Slope range:* 0 to 60 percent

*Elevation range:* 3,800 to 5,600 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Roy gravelly loam, 8 to 15 percent slopes, in an area  
of rangeland, 1,900 feet north and 2,600 feet east of  
the southwest corner of sec. 6, T. 13 N., R. 10 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2)  
gravelly loam, very dark grayish brown (10YR  
3/2) moist; moderate medium and fine granular  
structure; slightly hard, friable, slightly sticky,  
slightly plastic; many very fine and common fine  
and medium roots; common very fine and few  
fine discontinuous irregular pores; 5 percent  
cobbles and 25 percent pebbles; neutral; clear  
smooth boundary.

Bt1—8 to 12 inches; brown (10YR 5/3) very gravelly  
clay, very dark grayish brown (10YR 3/2) moist;  
moderate very fine subangular blocky structure;  
slightly hard, friable, moderately sticky and  
moderately plastic; common very fine and fine  
roots; common very fine and few fine  
discontinuous irregular pores; few faint clay  
films on faces of peds; 15 percent cobbles and  
40 percent pebbles; neutral; clear smooth  
boundary.

Bt2—12 to 24 inches; strong brown (7.5YR 5/6) very  
gravelly clay, strong brown (7.5YR 4/6) moist;  
strong medium angular blocky structure; hard,

firm, moderately sticky and moderately plastic; common fine and medium roots; few very fine discontinuous irregular pores; many distinct clay films on faces of peds; 10 percent cobbles and 50 percent pebbles; neutral; gradual wavy boundary.

**Btk**—24 to 31 inches; reddish yellow (7.5YR 6/6) very gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common fine roots; few very fine discontinuous irregular pores; common distinct clay films on faces of peds; 15 percent cobbles and 45 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

**Bk**—31 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly clay loam, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; few very fine discontinuous irregular pores; 20 percent cobbles and 45 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Thickness of the mollic epipedon:* 10 to 16 inches

*Depth to the Bk horizon:* 20 to 40 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: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bt1 horizon

Hue: 7.5YR or 10YR

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: 40 to 60 percent—5 to 10 percent cobbles; 35 to 50 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt2 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4 or 6

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 40 to 60 percent—5 to 10 percent cobbles; 35 to 50 percent pebbles  
Reaction: pH 6.6 to 7.8

#### Btk and Bk horizons

Hue: 7.5YR, 5YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Clay loam or sandy clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 40 to 65 percent—10 to 20 percent cobbles; 30 to 45 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

## 46B—Roy gravelly loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Roy and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 4 percent: 0 to 4 percent

Roy cobbly loam: 0 to 4 percent

Soils that are loamy throughout: 0 to 4 percent

Somewhat poorly drained soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**46C—Roy gravelly loam,  
4 to 8 percent slopes****Setting**

*Landform:* Alluvial fans

*Slope:* 4 to 8 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Roy and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 4 percent: 0 to 4 percent

Roy cobbly loam: 0 to 4 percent

Soils that are loamy throughout: 0 to 4 percent

Somewhat poorly drained soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**46D—Roy gravelly loam,  
8 to 15 percent slopes****Setting**

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Roy and similar soils: 85 percent

**Minor Components**

Soils that have slopes more than 15 percent: 0 to 4 percent

Roy cobbly loam: 0 to 4 percent

Soils that are loamy throughout: 0 to 4 percent

Soils that are calcareous throughout: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**146D—Roy cobbly loam,  
8 to 15 percent slopes****Setting**

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Roy and similar soils: 85 percent

**Minor Components**

Winspect soils: 0 to 5 percent

Danvers soils: 0 to 5 percent

Shawmut soils: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 146E—Roy cobbly loam, 15 to 35 percent slopes

### Setting

*Landform:* Hills

*Slope:* 15 to 35 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Roy and similar soils: 85 percent

#### Minor Components

Winspect soils: 0 to 5 percent

Danvers soils: 0 to 5 percent

Shawmut soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 351E—Roy-Shawmut-Danvers complex, 15 to 35 percent slopes

### Setting

*Landform:*

- Roy—Alluvial fans
- Shawmut—Alluvial fans
- Danvers—Alluvial fans

*Slope:*

- Roy—15 to 35 percent
- Shawmut—15 to 35 percent
- Danvers—15 to 35 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Roy and similar soils: 35 percent

Shawmut and similar soils: 25 percent

Danvers and similar soils: 25 percent

#### Minor Components

Soils that have slopes more than 35 percent: 0 to 5 percent

Soils that are calcareous throughout: 0 to 5 percent

Roy extremely cobbly loam: 0 to 5 percent

### Major Component Description

#### Roy

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

#### Shawmut

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

#### Danvers

*Surface layer texture:* Cobbly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 351F—Roy-Shawmut-Danvers complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Roy—Alluvial fans
- Shawmut—Alluvial fans
- Danvers—Alluvial fans

##### *Slope:*

- Roy—35 to 60 percent
- Shawmut—35 to 60 percent
- Danvers—35 to 60 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Roy and similar soils: 35 percent

Shawmut and similar soils: 25 percent

Danvers and similar soils: 25 percent

##### Minor Components

Soils that have slopes more than 60 percent: 0 to 5 percent

Soils that are calcareous throughout: 0 to 5 percent

Roy extremely cobbly loam: 0 to 5 percent

#### Major Component Description

##### Roy

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

##### Shawmut

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

##### Danvers

*Surface layer texture:* Cobbly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 846D—Roy-Tolbert complex, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Roy—Mountains
- Tolbert—Mountains

##### *Slope:*

- Roy—8 to 15 percent
- Tolbert—8 to 15 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Roy and similar soils: 65 percent

Tolbert and similar soils: 20 percent

##### Minor Components

Areas of rock outcrop: 0 to 8 percent

Danvers soils: 0 to 4 percent

Martinsdale soils: 0 to 3 percent

#### Major Component Description

##### Roy

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

##### Tolbert

*Surface layer texture:* Very stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 846E—Roy-Tolbert complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Roy—Mountains
- Tolbert—Mountains

#### *Slope:*

- Roy—15 to 35 percent
- Tolbert—15 to 35 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Roy and similar soils: 65 percent

Tolbert and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Areas of rubble land: 0 to 7 percent

### Major Component Description

#### Roy

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

#### Tolbert

*Surface layer texture:* Stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 846F—Roy-Tolbert complex, 35 to 60 percent slopes

### Setting

#### *Landform:*

- Roy—Mountains
- Tolbert—Mountains

#### *Slope:*

- Roy—35 to 60 percent
- Tolbert—35 to 60 percent

*Elevation:* 3,800 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Roy and similar soils: 65 percent

Tolbert and similar soils: 20 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Areas of rubble land: 0 to 7 percent

### Major Component Description

#### Roy

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

#### Tolbert

*Surface layer texture:* Stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**100—Rubble land-Rock outcrop complex****Setting***Landform:*

- Rubble land—Mountains
- Rock outcrop—Mountains

*Elevation:* 3,900 to 7,600 feet*Mean annual precipitation:* 15 to 30 inches*Frost-free period:* 30 to 90 days**Composition****Major Components**

Rubble land: 55 percent

Rock outcrop: 30 percent

**Minor Components**

Areas of soils that support vegetation: 0 to 15 percent

**Major Component Description****Rubble land***Definition:* Areas having more than 90 percent boulders, stones, and cobbles on the surface, supporting little or no vegetation**Rock outcrop***Definition:* Areas of exposed bedrock**Rumblecreek Series***Depth class:* Very deep*Drainage class:* Well drained*Permeability:* Moderately slow*Landform:* Moraines, mountains, and hills*Parent material:* Alpine till and colluvium*Slope range:* 2 to 60 percent*Elevation range:* 4,000 to 6,500 feet*Annual precipitation:* 18 to 30 inches*Annual air temperature:* 38 to 42 degrees F*Frost-free period:* 70 to 90 days**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Haplic Glossudalfs**Typical Pedon**

Rumblecreek gravelly loam, in an area of Winfall-Rumblecreek gravelly loams, 2 to 8 percent slopes, in an area of woodland, 2,800 feet south and 400 feet west of the northeast corner of sec. 30, T. 15 N., R. 10 W.

Oe—3 inches to 0; partially decomposed organic matter.

E1—0 to 5 inches; light gray (10YR 7/2) gravelly loam, dark grayish brown (10YR 4/2) moist;

moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; many very fine and fine irregular pores; 20 percent pebbles; slightly acid; gradual wavy boundary.

E2—5 to 13 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine irregular pores; 25 percent pebbles; neutral; gradual wavy boundary.

Bt/E—13 to 26 inches; 60 percent is grayish brown (10YR 5/2) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist (B part); 40 percent is light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist (E part); weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine irregular pores; few faint clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; neutral; gradual wavy boundary.

Bt—26 to 60 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine irregular pores; common faint clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; neutral.

**Range in Characteristics***Soil temperature:* 40 to 46 degrees F*Moisture control section:* Between depths of 4 and 12 inches*Depth to the argillic horizon:* 10 to 22 inches*E horizons*

Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 5.1 to 7.3

*Bt/E horizon*

Hue: B part—10YR or 7.5YR; E part—10YR or 7.5YR

Value: B part—5 or 6 dry, 4 or 5 moist; E part—6 or 7 dry, 5 or 6 moist

Chroma: B part—2, 3, 4, or 6; E part—2 or 3

Texture, mixed: Loam, clay loam, or sandy clay loam

Clay content, mixed: 20 to 35 percent  
 Content of rock fragments: 35 to 60 percent—0 to  
 10 percent cobbles; 35 to 50 percent pebbles  
 Reaction: pH 5.6 to 6.5

*Bt horizon*

Hue: 10YR or 7.5YR  
 Value: 5 or 6 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  
 10 percent cobbles; 35 to 50 percent pebbles  
 Reaction: pH 5.6 to 6.5

**271C—Rumblecreek-Water complex,  
 2 to 8 percent slopes**

**Setting**

*Landform:* Moraines  
*Slope:* 2 to 8 percent  
*Elevation:* 4,000 to 4,700 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Rumblecreek and similar soils: 75 percent  
 Water: 10 percent

**Minor Components**

Poorly drained soils: 0 to 5 percent  
 Soils that have a thick volcanic ash surface: 0 to  
 5 percent  
 Soils that have slopes more than 8 percent: 0 to  
 5 percent

**Major Component Description**

**Rumblecreek**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

**Water**

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**271E—Rumblecreek-Water complex,  
 8 to 25 percent slopes**

**Setting**

*Landform:* Moraines  
*Slope:* 8 to 25 percent  
*Elevation:* 4,000 to 4,700 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Rumblecreek and similar soils: 75 percent  
 Water: 10 percent

**Minor Components**

Poorly drained soils: 0 to 5 percent  
 Soils that have a thick volcanic ash surface: 0 to  
 5 percent  
 Slopes more than 25 percent: 0 to 5 percent

**Major Component Description**

**Rumblecreek**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

**Water**

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 271F—Rumblecreek-Water complex, 25 to 50 percent slopes

#### Setting

*Landform:* Moraines  
*Slope:* 25 to 50 percent  
*Elevation:* 4,000 to 4,700 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Rumblecreek and similar soils: 75 percent  
 Water: 10 percent

##### Minor Components

Poorly drained soils: 0 to 5 percent  
 Soils that have a thick volcanic ash surface: 0 to 5 percent  
 Soils that have slopes more than 50 percent: 0 to 5 percent

#### Major Component Description

##### Rumblecreek

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

##### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 395D—Rumblecreek gravelly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

### Composition

##### Major Components

Rumblecreek and similar soils: 85 percent

##### Minor Components

Areas of rock outcrop: 0 to 5 percent  
 Bignell soils: 0 to 5 percent  
 Crow soils: 0 to 3 percent  
 Trapps soils: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 395E—Rumblecreek gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Rumblecreek and similar soils: 85 percent

##### Minor Components

Areas of rock outcrop: 0 to 3 percent  
 Bignell soils: 0 to 3 percent  
 Soils that have slopes more than 35 percent: 0 to 3 percent  
 Crow soils: 0 to 3 percent  
 Trapps soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 395F—Rumblecreek gravelly loam, 35 to 60 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Rumblecreek and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 3 percent  
 Bignell soils: 0 to 3 percent  
 Soils that have slopes more than 60 percent: 0 to 3 percent  
 Crow soils: 0 to 3 percent  
 Trapps soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Saypo Series

*Depth class:* Very deep  
*Drainage class:* Somewhat poorly drained  
*Permeability:* Moderately slow  
*Landform:* Stream terraces and flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 4 percent  
*Elevation range:* 3,800 to 5,000 feet  
*Annual precipitation:* 10 to 19 inches  
*Annual air temperature:* 39 to 44 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.

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

Ap—0 to 7 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 and common medium roots; many very fine irregular pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—7 to 15 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 and common medium roots; many very fine irregular pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—15 to 31 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; 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—31 to 47 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 and 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—47 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 pebbles; 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: 2 or 3 moist; 3 or 4 dry

Chroma: 1 or 2

Clay content: 22 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: 7.4 to 8.4

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 moist; 5 to 7 dry

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 pebbles

Calcium carbonate equivalent: 20 to 25 percent

Reaction: pH 7.9 to 8.4

#### Bk2 and Bk3 horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 or 3

Texture: Clay loam, loam, silt loam, or silty clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Calcium carbonate equivalent: 30 to 35 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.9 to 8.4

#### C horizon

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4 or 5 moist; 5 or 6 dry

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 pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.9 to 8.4

## 435—Saypo loam, cool, 0 to 4 percent slopes, rarely flooded

### Setting

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Saypo and similar soils: 85 percent

#### Minor Components

Poorly drained soils: 0 to 4 percent

Kleinschmidt soils: 0 to 4 percent

Gregson soils: 0 to 4 percent

Very poorly drained soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 445—Saypo loam, 0 to 4 percent slopes, rarely flooded

### Setting

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Saypo and similar soils: 85 percent

#### Minor Components

Gregson soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Soils that have a saline surface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 535—Saypo loam, cool, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

#### Major Components

Saypo and similar soils: 85 percent

#### Minor Components

Gregson soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Soils that have a saline surface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 545—Saypo loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

#### Major Components

Saypo and similar soils: 85 percent

#### Minor Components

Gregson soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

Soils that have a saline surface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Shawmut Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains, alluvial fans, stream terraces, and moraines

*Parent material:* Alluvium and alpine till

*Slope range:* 0 to 60 percent

*Elevation range:* 3,800 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 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.

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 structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and common fine and medium pores; 5 percent cobbles and 15 percent pebbles; 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 and moderately plastic; common very fine and fine roots; many very fine and fine and common medium pores; common faint clay films on faces of peds; 5 percent cobbles and 25 percent pebbles; 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 structure; hard, firm, slightly sticky, slightly plastic; few very fine roots; many very fine and common fine and medium pores; few faint clay films on faces of peds; 10 percent cobbles and 35 percent pebbles; 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 pores; 10 percent cobbles and 35 percent pebbles; common lime casts on underside 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 pores; 20 percent cobbles and 45 percent pebbles; disseminated lime; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the calcic horizon:* 9 to 20 inches

*Soil phases:* Cobbly or bouldery

#### A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 15 to 80 percent—0 to 40 percent boulders and stones; 5 to 25 percent cobbles; 10 to 50 percent pebbles

Rock fragments, surface cover: 0.01 to 0.1 percent stones or boulders

Reaction: pH 6.6 to 7.3

#### Bt horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 15 to 80 percent—0 to 15 percent stones; 0 to 20 percent cobbles; 15 to 45 percent pebbles

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 or 3

Texture: Clay loam, loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent stones; 0 to 20 percent cobbles; 30 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

#### Bk1 horizon

Hue: 2.5Y or 10YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3  
 Texture: Sandy loam or loam  
 Clay content: 15 to 25 percent  
 Content of rock fragments: 35 to 80 percent—0 to  
 20 percent stones; 0 to 20 percent cobbles;  
 30 to 75 percent pebbles  
 Calcium carbonate equivalent: 15 to 25 percent  
 Reaction: pH 7.9 to 9.0

*Bk2 horizon*

Hue: 2.5Y or 10YR  
 Value: 5 to 8 dry; 4 to 7 moist  
 Chroma: 2 or 3  
 Texture: Sandy loam or loam  
 Clay content: 5 to 25 percent  
 Content of rock fragments: 50 to 85 percent—0 to  
 20 percent stones; 0 to 20 percent cobbles;  
 45 to 70 percent pebbles  
 Calcium carbonate equivalent: 10 to 25 percent  
 Electrical conductivity: Less than 2 mmhos/cm  
 Reaction: pH 7.9 to 9.0

**51B—Shawmut gravelly loam,  
0 to 4 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Shawmut and similar soils: 85 percent

**Minor Components**

Shawmut cobbly loam: 0 to 5 percent  
 Soils that have slopes more than 4 percent: 0 to  
 5 percent  
 Soils that are clayey throughout: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**51C—Shawmut gravelly loam,  
4 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Shawmut and similar soils: 85 percent

**Minor Components**

Slopes more than 8 percent: 0 to 4 percent  
 Shawmut cobbly loam: 0 to 4 percent  
 Soils that are clayey throughout: 0 to 4 percent  
 Soils that have a calcareous surface layer: 0 to  
 3 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### 51D—Shawmut gravelly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Shawmut and similar soils: 85 percent

##### Minor Components

Soils that have slopes more than 15 percent: 0 to 4 percent

Shawmut cobbly loam: 0 to 4 percent

Soils that are clayey throughout: 0 to 4 percent

Soils that have a calcareous surface layer: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 53B—Shawmut-Martinsdale complex, 0 to 4 percent slopes

#### Setting

*Landform:*

• Shawmut—Stream terraces

• Martinsdale—Stream terraces

*Slope:*

• Shawmut—0 to 4 percent

• Martinsdale—0 to 4 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 45 percent

Martinsdale and similar soils: 40 percent

#### Minor Components

Soils that have slopes more than 4 percent: 0 to 8 percent

Soils that have clayey subsoil: 0 to 7 percent

#### Major Component Description

##### Shawmut

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

##### Martinsdale

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 53C—Shawmut-Martinsdale complex, 4 to 8 percent slopes

#### Setting

*Landform:*

• Shawmut—Alluvial fans

• Martinsdale—Alluvial fans

*Slope:*

• Shawmut—4 to 8 percent

• Martinsdale—4 to 8 percent

*Elevation:* 3,800 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

## Composition

### Major Components

Shawmut and similar soils: 45 percent  
Martinsdale and similar soils: 40 percent

### Minor Components

Soils that have slopes more than 8 percent: 0 to 8 percent  
Very gravelly clayey soils: 0 to 7 percent

### Major Component Description

#### Shawmut

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

#### Martinsdale

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 151C—Shawmut cobbly loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

### Minor Components

Soils that have slopes more than 8 percent: 0 to 5 percent  
Roy soils: 0 to 5 percent  
Martinsdale soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 151D—Shawmut cobbly loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Roy soils: 0 to 8 percent  
Danvers soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 151E—Shawmut cobbly loam, 15 to 35 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Roy soils: 0 to 8 percent  
Danvers soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 151F—Shawmut cobbly loam, 35 to 60 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Roy soils: 0 to 8 percent  
Danvers soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 251D—Shawmut stony loam, 0 to 15 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 0 to 15 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Roy soils: 0 to 8 percent  
Winspect soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 251E—Shawmut stony loam, 15 to 35 percent slopes

### Setting

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Roy soils: 0 to 8 percent  
Winspect soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 451E—Shawmut very bouldery loam, 8 to 25 percent slopes

### Setting

*Landform:* Moraines  
*Slope:* 8 to 25 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Poorly drained soils: 0 to 4 percent  
Very gravelly sandy soils: 0 to 4 percent  
Soils that have slopes more than 25 percent: 0 to 4 percent  
Winspect soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Very bouldery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 451F—Shawmut very bouldery loam, 25 to 50 percent slopes

### Setting

*Landform:* Moraines  
*Slope:* 25 to 50 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Poorly drained soils: 0 to 4 percent  
Very gravelly sandy soils: 0 to 4 percent  
Soils that have slopes more than 50 percent: 0 to 4 percent  
Winspect soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Very bouldery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 551F—Shawmut extremely bouldery loam, 8 to 50 percent slopes

### Setting

*Landform:* Moraines  
*Slope:* 8 to 50 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 85 percent

#### Minor Components

Straw soils in swales: 0 to 5 percent  
 Quigley soils: 0 to 5 percent  
 Poorly drained soils: 0 to 3 percent  
 Areas of open water: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Extremely bouldery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 651C—Shawmut-Winspect-Water complex, 2 to 8 percent slopes

### Setting

*Landform:*  
 • Shawmut—Moraines  
 • Winspect—Moraines  
*Slope:*  
 • Shawmut—2 to 8 percent  
 • Winspect—2 to 8 percent  
*Elevation:* 3,800 to 5,500 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Shawmut and similar soils: 50 percent  
 Winspect and similar soils: 25 percent  
 Water: 10 percent

#### Minor Components

Straw soils: 0 to 5 percent  
 Martinsdale soils: 0 to 5 percent  
 Poorly drained soils: 0 to 5 percent

### Major Component Description

#### Shawmut

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

#### Winspect

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.1 inches

#### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 651E—Shawmut-Winspect-Water complex, 8 to 25 percent slopes

#### Setting

##### *Landform:*

- Shawmut—Moraines
- Winspect—Moraines

##### *Slope:*

- Shawmut—8 to 25 percent
- Winspect—8 to 25 percent

*Elevation:* 3,800 to 5,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Shawmut and similar soils: 50 percent

Winspect and similar soils: 25 percent

Water: 10 percent

##### Minor Components

Straw soils: 0 to 5 percent

Martinsdale soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

#### Major Component Description

##### Shawmut

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

##### Winspect

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.1 inches

##### Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 651F—Shawmut-Winspect-Water complex, 25 to 50 percent slopes

#### Setting

##### *Landform:*

- Shawmut—Moraines
- Winspect—Moraines
- Water—Moraines

##### *Slope:*

- Shawmut—25 to 50 percent
- Winspect—25 to 50 percent

*Elevation:* 3,800 to 5,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Shawmut and similar soils: 50 percent

Winspect and similar soils: 25 percent

Water: 10 percent

##### Minor Components

Straw soils: 0 to 5 percent

Martinsdale soils: 0 to 5 percent

Poorly drained soils: 0 to 5 percent

#### Major Component Description

##### Shawmut

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

##### Winspect

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.1 inches

## Water

*Definition:* Areas of open water

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Silverchief Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Colluvium derived from limestone and calcareous argillite

*Slope range:* 8 to 35 percent

*Elevation range:* 4,300 to 6,000 feet

*Annual precipitation:* 18 to 25 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Fine, mixed, superactive, frigid  
Calcic Haplustalfs

## Typical Pedon

Silverchief cobbly loam, in an area of Silverchief-Trapps complex, 15 to 35 percent slopes, in an area of woodland, 2,900 feet north and 600 feet west of the southeast corner of sec. 33, T. 11 N., R. 11 W.

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

E—0 to 6 inches; pale brown (10YR 6/3) cobbly loam, brown (10YR 5/3) moist; moderate fine granular structure; soft, friable, nonsticky, slightly plastic; many very fine and fine and few medium roots; many very fine and fine discontinuous pores; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—6 to 23 inches; light yellowish brown (10YR 6/4) gravelly silty clay, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; very hard, very firm, slightly sticky, moderately plastic; many very fine and fine and common medium roots; many very fine and fine discontinuous pores; few faint clay films on faces

of peds; 20 percent pebbles; slightly alkaline; clear wavy boundary.

Bt2—23 to 30 inches; light yellowish brown (10YR 6/4) gravelly silty clay, yellowish brown (10YR 5/4) moist; strong medium subangular blocky structure; extremely hard, very firm, slightly sticky, moderately plastic; many very fine, fine, and medium roots; many very fine and fine continuous pores; few faint clay films on faces of peds; 20 percent pebbles; slightly alkaline; clear smooth boundary.

Bk1—30 to 39 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky and slightly plastic; 5 percent cobbles and 35 percent pebbles; many segregated masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

Bk2—39 to 60 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, moderately plastic; few very fine, fine, and coarse roots; few very fine and fine discontinuous pores; 10 percent cobbles and 35 percent pebbles; disseminated lime; violently effervescent; strongly alkaline.

## Range in Characteristics

*Soil temperature:* 40 to 44 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the calcic horizon:* 20 to 35 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 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles

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

Clay content: 40 to 60 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

### Bk horizons

Hue: 7.5YR, 5YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 3 or 4  
 Clay content: 30 to 40 percent  
 Content of rock fragments: 15 to 50 percent—0 to  
 15 percent cobbles; 15 to 35 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Reaction: pH 7.4 to 8.4

### 599D—Silverchief-Trapps complex, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Silverchief—Mountains
- Trapps—Mountains

##### *Slope:*

- Silverchief—8 to 15 percent
- Trapps—8 to 15 percent

*Elevation:* 4,300 to 6,000 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Silverchief and similar soils: 45 percent  
 Trapps and similar soils: 40 percent

##### Minor Components

Whitecow soils: 0 to 15 percent

#### Major Component Description

##### Silverchief

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 6.1 inches

##### Trapps

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 599E—Silverchief-Trapps complex, 15 to 35 percent slopes

#### Setting

##### *Landform:*

- Silverchief—Mountains
- Trapps—Mountains

##### *Slope:*

- Silverchief—15 to 35 percent
- Trapps—15 to 35 percent

*Elevation:* 4,300 to 6,000 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Silverchief and similar soils: 45 percent  
 Trapps and similar soils: 40 percent

##### Minor Components

Whitecow soils: 0 to 10 percent

Soils that do not have rock fragments: 0 to 5 percent

#### Major Component Description

##### Silverchief

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.9 inches

##### Trapps

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Sixbeacon Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate to the 3Bk3 horizon, rapid below

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 3,800 to 5,200 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 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.

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 pebbles; 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 pebbles; 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 pores; 10 percent pebbles; 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 pebbles; 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 and 60 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 41 to 46 degrees F

*Moisture control section:* Between depths of 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 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:* 8 to 13 inches

**Ap horizon**

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 35 percent—0 to 15 percent cobbles; 15 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

**Bw horizon**

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

**Bk1 horizon**

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 pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

**2Bk2 horizon**

Value: 7 or 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 pebbles

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

Clay content: 0 to 5 percent

Content of rock fragments: 50 to 80 percent—10 to 20 percent cobbles; 40 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

### 137B—Sixbeacon cobbly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Sixbeacon and similar soils: 85 percent

##### Minor Components

Gravelly loam surface: 0 to 8 percent  
 Cetrack soils: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 137C—Sixbeacon cobbly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Sixbeacon and similar soils: 85 percent

##### Minor Components

Soils that have a gravelly loam surface: 0 to 8 percent  
 Cetrack soils: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 137D—Sixbeacon cobbly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Sixbeacon and similar soils: 85 percent

##### Minor Components

Soils that have a gravelly loam surface: 0 to 8 percent  
 Cetrack soils: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 237B—Sixbeacon gravelly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Sixbeacon and similar soils: 85 percent

##### Minor Components

Anaconda soils: 0 to 10 percent  
 Soils that have a cobbly loam surface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 237C—Sixbeacon gravelly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Sixbeacon and similar soils: 85 percent

##### Minor Components

Anaconda soils: 0 to 10 percent  
 Soils that have a cobbly loam surface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 5—Slickens-Aquents complex, 0 to 2 percent slopes, occasionally flooded

#### Setting

*Landform:*

- Slickens—Flood plains
- Aquents—Flood plains

*Slope:*

- Slickens—0 to 2 percent
- Aquents—0 to 2 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Slickens: 45 percent

Aquents and similar soils: 40 percent

##### Minor Components

Very poorly drained soils: 0 to 5 percent

Areas of open water: 0 to 5 percent

Areas of riverwash: 0 to 5 percent

#### Major Component Description

##### Slickens

*Definition:* Material from ore mills, commonly freshly ground rock that has undergone chemical treatment during the milling process

*Flooding:* Occasional

##### Aquents

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 105A—Slickens-Fluvaquentic Endoaquolls complex, 0 to 2 percent slopes, severely impacted

### Setting

*Landform:*

- Slickens—Flood plains
- Fluvaquentic Endoaquolls—Flood plains

*Slope:*

- Slickens—0 to 2 percent
- Fluvaquentic Endoaquolls—0 to 2 percent

*Elevation:* 4,600 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Slickens: 50 percent

Fluvaquentic Endoaquolls: 35 percent

#### Minor Components

Somewhat poorly drained soils: 0 to 10 percent

Areas of riverwash: 0 to 5 percent

### Major Component Description

#### Slickens

*Definition:* Material from ore mills, commonly freshly ground rock that has undergone chemical treatment during the milling process

*Flooding:* Occasional

#### Fluvaquentic Endoaquolls

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

*Dominant parent material:* Alluvium

*Flooding:* Occasional

*Water table:* Apparent

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Straw Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Drainageways and alluvial fans

*Parent material:* Calcareous alluvium and alpine till

*Slope range:* 0 to 25 percent

*Elevation range:* 3,600 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Straw loam, in an area of Quigley-Straw-Water complex, 2 to 8 percent slopes, in an area of cropland, 1,000 feet south and 2,300 feet west of the northeast corner of sec. 32, T. 14 N., R. 11 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine pores; neutral; clear smooth boundary.

A—10 to 18 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; neutral; gradual smooth boundary.

Bw—18 to 25 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; few very fine pores; neutral; gradual wavy boundary.

Bk1—25 to 29 inches; dark yellowish brown (10YR 4/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine roots; few very fine pores; few fine filaments and threads of lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk2—29 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; few fine filaments and threads of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; not dry in all parts for 60 or more consecutive days following July 1

*Thickness of the mollic epipedon:* 16 to 40 inches

*Depth to the Bk horizon:* 13 to 30 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent, with less than 15 to 35 percent fine and coarser sand

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 8.4

#### Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Loam, silt loam, silty clay loam, or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bk horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Loam, silt loam, silty clay loam, or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 3 to 15 percent

Reaction: pH 6.6 to 8.4

## 25B—Straw loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans

*Slope:* 0 to 4 percent

*Elevation:* 3,600 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Straw and similar soils: 85 percent

#### Minor Components

Soils that have very gravelly subsoils: 0 to 10 percent

Soils that have slopes more than 4 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Tanna Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Sedimentary plains and hills

*Parent material:* Material derived from semiconsolidated sedimentary beds

*Slope range:* 0 to 15 percent

*Elevation range:* 3,600 to 5,200 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Tanna loam, 4 to 8 percent slopes, in an area of rangeland, 3,600 feet south and 600 feet west of the northeast corner of sec. 28, T. 9 N., R. 9 W.

A—0 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium granular structure and weak thin platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine irregular pores; neutral; clear smooth boundary.

BA—5 to 8 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure parting to moderate medium granular structure; slightly hard, friable,

moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine irregular and tubular pores; neutral; clear smooth boundary.

**Bt**—8 to 17 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure parting to strong medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; common very fine roots; few very fine and fine tubular pores; many distinct brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

**Bk**—17 to 31 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; few very fine roots; few very fine tubular pores; few faint yellowish brown (10YR 5/4) organic cutans on faces of peds; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

**Cr**—31 to 60 inches; grayish brown (2.5YR 5/2) semiconsolidated siltstone interbedded with lenses of sandstone.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; dry in some part 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 12 inches (includes part of the argillic horizon)

*Depth to the Bk horizon:* 10 to 20 inches

*Depth to bedrock:* 20 to 40 inches

#### *A horizon*

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers

Reaction: pH 6.6 to 7.8

#### *BA and Bt horizons*

Hue: 10YR or 2.5Y

Value: 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers  
Electrical conductivity: Less than 4 mmhos/cm  
Reaction: pH 6.6 to 8.4

#### *Bk horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers

Electrical conductivity: 2 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 65C—Tanna loam, 4 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 4 to 8 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Tanna and similar soils: 85 percent

#### Minor Components

Soils that are very gravelly below 7 inches: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

Soils that are shallow: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**65D—Tanna loam, 8 to 15 percent slopes****Setting**

*Landform:* Hills

*Slope:* 8 to 15 percent

*Elevation:* 3,600 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition****Major Components**

Tanna and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent

Soils that are shallow: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**265C—Tanna-Boxwell loams,  
4 to 8 percent slopes****Setting**

*Landform:*

- Tanna—Sedimentary plains
- Boxwell—Sedimentary plains

*Slope:*

- Tanna—4 to 8 percent
- Boxwell—4 to 8 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition****Major Components**

Tanna and similar soils: 65 percent

Boxwell and similar soils: 20 percent

**Minor Components**

Castner soils: 0 to 5 percent

Soils that have channery surface layers: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

**Major Component Description****Tanna**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

**Boxwell**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**265D—Tanna-Boxwell loams,  
8 to 15 percent slopes****Setting**

*Landform:*

- Tanna—Hills
- Boxwell—Hills

*Slope:*

- Tanna—8 to 15 percent
- Boxwell—8 to 15 percent

*Elevation:* 4,000 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 90 to 105 days**Composition****Major Components**

Tanna and similar soils: 65 percent

Boxwell and similar soils: 20 percent

**Minor Components**

Castner soils: 0 to 5 percent

Soils that have channery surface layers: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

**Major Component Description****Tanna***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 4.9 inches**Boxwell***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tetonview Series***Depth class:* Very deep*Drainage class:* Poorly drained*Permeability:* Moderately slow*Landform:* Stream terraces and flood plains*Parent material:* Calcareous alluvium*Slope range:* 0 to 4 percent*Elevation range:* 3,800 to 6,000 feet*Annual precipitation:* 10 to 19 inches*Annual air temperature:* 39 to 44 degrees F*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

**Typical Pedon**

Tetonview loam, 0 to 4 percent slopes, in an area of pasture, 1,100 feet south and 1,400 feet east of the northwest corner of sec. 10, T. 6 N., R. 10 W.

A—0 to 9 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; moderate fine granular structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; common very fine and fine pores; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkg1—9 to 17 inches; very dark grayish brown (10YR 3/2) silty clay loam, light brownish gray (10YR 6/2) dry; few fine distinct dark yellowish brown (10YR 4/6) redox concentrations; moderate fine and medium granular structure; hard, friable, slightly sticky, moderately plastic; common very fine and fine roots; few very fine pores; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkg2—17 to 42 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2Cg—42 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, light brownish gray (10YR 6/2) dry; massive; hard, friable, nonsticky, nonplastic; few very fine roots; few very fine pores; 5 percent cobbles and 30 percent pebbles; strongly effervescent; moderately alkaline.

**Range in Characteristics***Soil temperature:* 41 to 47 degrees F*Moisture control section:* Between depths of 4 and 12 inches*Depth to the seasonal water table:* 12 to 24 inches*Depth to the calcic horizon:* 7 to 13 inches*Thickness of the mollic epipedon:* 7 to 16 inches*A horizon*

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 3 to 5 dry

Chroma: 1 or 2  
 Clay content: 20 to 27 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 1 to 5 percent  
 Reaction: pH 7.4 to 8.4

**Bkg1 horizon**

Hue: 10YR or 2.5Y  
 Value: 3 to 6 moist; 5 to 7 dry  
 Texture: Loam, clay loam, silt loam, or silty clay loam  
 Clay content: 20 to 35 percent  
 Redox features: None to common; faint to prominent redox concentrations  
 Content of rock fragments: 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 7.9 to 8.4

**Bkg2 horizon**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 4 to 6 moist; 6 or 7 dry  
 Texture: Loam, clay loam, silt loam, or silty clay loam  
 Clay content: 20 to 35 percent  
 Redox features: None to common; faint to many redox concentrations  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 7.9 to 8.4

**2Cg horizon**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 4 to 6 moist; 6 or 7 dry  
 Texture: Loam, clay loam, sandy clay loam, or silt loam  
 Clay content: 20 to 30 percent  
 Redox features: None to common; faint to many redox concentrations  
 Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 7.9 to 8.4

### **635—Tetonview loam, 0 to 4 percent slopes**

**Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent

*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 105 days

**Composition****Major Components**

Tetonview and similar soils: 85 percent

**Minor Components**

Blossberg soils: 0 to 3 percent  
 Poronto soils: 0 to 3 percent  
 Very poorly drained soils: 0 to 3 percent  
 Soils that have a moderately saline surface: 0 to 3 percent  
 Saypo soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **735—Tetonview-Blossberg loams, 0 to 4 percent slopes, rarely flooded**

**Setting***Landform:*

- Tetonview—Flood plains
- Blossberg—Flood plains

*Slope:*

- Tetonview—0 to 4 percent
- Blossberg—0 to 4 percent

*Elevation:* 3,800 to 6,000 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 105 days

**Composition****Major Components**

Tetonview and similar soils: 45 percent  
 Blossberg and similar soils: 40 percent

**Minor Components**

Very poorly drained soils: 0 to 10 percent  
Areas of open water: 0 to 5 percent

**Major Component Description****Tetonview**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 9.2 inches

**Blossberg**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**835—Tetonview loam, 0 to 4 percent slopes, rarely flooded****Setting**

*Landform:* Flood plains  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,800 feet  
*Mean annual precipitation:* 10 to 19 inches  
*Frost-free period:* 70 to 105 days

**Composition****Major Components**

Tetonview and similar soils: 85 percent

**Minor Components**

Blossberg soils: 0 to 3 percent  
Soils that have a peat surface: 0 to 3 percent  
Turrah soils: 0 to 3 percent  
Very poorly drained soils: 0 to 3 percent  
Saypo soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tevis Series**

*Depth class:* Very deep  
*Drainage class:* Somewhat excessively drained  
*Permeability:* Moderately rapid  
*Landform:* Mountains  
*Parent material:* Colluvium derived from argillite and quartzite  
*Slope range:* 4 to 80 percent  
*Elevation range:* 3,800 to 5,200 feet  
*Annual precipitation:* 25 to 40 inches  
*Annual air temperature:* 38 to 42 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Dystric Eutrudepts

**Typical Pedon**

Tevis gravelly loam, 35 to 60 percent slopes, in an area of woodland, 500 feet north and 100 feet west of the southeast corner of sec. 8, T. 15 N., R. 11 W.

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

A—0 to 4 inches; light brownish gray (10YR 6/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many fine and medium irregular pores; 5 percent cobbles and 30 percent pebbles; slightly acid; clear wavy boundary.

E1—4 to 9 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many

fine and medium roots; many fine and medium irregular pores; 5 percent cobbles and 50 percent pebbles; slightly acid; clear wavy boundary.

E2—9 to 23 inches; light gray (10YR 7/2) extremely gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium irregular pores; 5 percent cobbles and 60 percent pebbles; slightly acid; clear wavy boundary.

E/Bw—23 to 60 inches; 80 percent is light gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 5/3) moist (E part); 20 percent is pale brown (10YR 6/3) extremely gravelly loam, yellowish brown (10YR 5/4) moist (B part); weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine roots; many very fine, fine, and medium pores; 5 percent cobbles and 75 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 46 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

#### A horizon

Hue: 10YR or 7.5YR

Value: 4 to 6 dry

Chroma: 2 or 3

Clay content: 10 to 15 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 5.6 to 7.3

#### E1 horizon

Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 5 to 10 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles

Reaction: pH 5.6 to 7.3

#### E2 horizon

Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 to 3

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 5 to 10 percent

Content of rock fragments: 55 to 80 percent—0 to 10 percent cobbles; 55 to 70 percent pebbles

Reaction: pH 5.6 to 7.3

#### E/Bw horizon

Hue: E part—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—1 to 3; B part—2 to 4

Texture: Sandy loam, fine sandy loam, or loam

Clay content: 5 to 10 percent

Content of rock fragments: 60 to 85 percent—0 to 10 percent cobbles; 60 to 75 percent pebbles

Reaction: pH 6.1 to 7.3

## 486D—Tevis gravelly loam, 4 to 15 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 4 to 15 percent

*Elevation:* 3,800 to 5,200 feet

*Mean annual precipitation:* 25 to 40 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Tevis and similar soils: 85 percent

#### Minor Components

Hoyt soils: 0 to 5 percent

Soils that have a dark color surface: 0 to 5 percent

Areas of rock outcrop: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 486E—Tevis gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 25 to 40 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Tevis and similar soils: 85 percent

##### Minor Components

Hoyt soils: 0 to 5 percent  
 Soils that have a dark color surface: 0 to 5 percent  
 Areas of rock outcrop: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 486F—Tevis gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 3,800 to 5,200 feet  
*Mean annual precipitation:* 25 to 40 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Tevis and similar soils: 85 percent

##### Minor Components

Hoyt soils: 0 to 5 percent  
 Soils that have a dark color surface: 0 to 5 percent  
 Areas of rock outcrop: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Tigeron Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Alluvium or colluvium derived from argillite and quartzite  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,600 to 7,000 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 35 to 38 degrees F  
*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

#### Typical Pedon

Tigeron very gravelly loam, 35 to 60 percent slopes, in an area of woodland, 2,600 feet south and 2,800 feet east of the northwest corner of sec. 30, T. 12 N., R. 10 W.

Oe—5 inches to 0; partially decomposed forest litter.  
 E—0 to 9 inches; light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; strong medium granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine and common coarse roots; many very

fine and fine pores; 45 percent pebbles; moderately acid; gradual wavy boundary.

E and Bt—9 to 15 inches; 60 percent is pinkish gray (7.5YR 7/2) extremely gravelly loam, pinkish gray (7.5YR 6/2) moist (E part); 40 percent is brown (7.5YR 5/4) extremely gravelly loam lamellae  $\frac{1}{4}$ - to  $\frac{3}{8}$ -inch thick, dark brown (7.5YR 4/4) moist (B part); weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, moderately plastic; many very fine and fine and common coarse roots; many very fine and fine pores; 15 percent cobbles and 45 percent pebbles; slightly acid; gradual wavy boundary.

Bt and E—15 to 42 inches; 70 percent is brown (7.5YR 5/4) extremely gravelly clay loam lamellae  $\frac{3}{8}$ - to  $\frac{1}{2}$ -inch thick, dark brown (7.5YR 4/4) moist (B part); 30 percent is pinkish gray (7.5YR 7/2) extremely gravelly loam, pinkish gray (7.5YR 6/2) moist (E part); weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; few faint clay films on faces of pedis; 15 percent cobbles and 50 percent pebbles; slightly acid; gradual wavy boundary.

Bt—42 to 60 inches; strong brown (7.5YR 5/6) extremely gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; few faint clay films on faces of pedis; 20 percent cobbles and 55 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

*Depth to the argillic horizon:* 13 to 24 inches

#### *E horizon*

Hue: 7.5YR or 10YR

Value: 6 to 8 dry; 3 to 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent channers

Reaction: pH 5.1 to 6.5

#### *E and Bt horizon*

Hue: E part—7.5YR or 10YR; B part—7.5YR or 10YR

Value: E part—6 to 8 dry, 3 to 6 moist; B part—5 or 6 dry, 4 or 5 moist

Chroma: E part—2 or 3; B part—2 to 4 or 6

Texture: E part—sandy loam or loam; B part—sandy loam, loam, clay loam, or sandy clay loam

Clay content: E part—10 to 22 percent; B part—10 to 35 percent

Content of rock fragments: 25 to 70 percent—10 to 25 percent cobbles; 15 to 45 percent pebbles

Reaction: pH 5.1 to 6.5

#### *Bt and E horizon*

Hue: B part—7.5YR or 10YR; E part—7.5YR or 10YR

Value: B part—5 or 6 dry, 4 or 5 moist; E part—6 to 8 dry, 3 to 6 moist

Chroma: B part—3, 4, or 6; E part—2 or 3

Texture: B part—sandy loam, loam, sandy clay loam, or clay loam; E part—sandy loam or loam

Clay content: B part—15 to 35 percent; E part—10 to 22 percent

Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 5.1 to 6.5

#### *Bt horizon*

Hue: 7.5YR or 10YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4 or 6

Texture: Sandy loam, sandy clay loam, clay loam, or loam

Clay content: 15 to 35 percent

Content of rock fragments: 60 to 85 percent—20 to 30 percent cobbles; 40 to 55 percent pebbles

Reaction: pH 5.1 to 6.5

## 93E—Tigeron very gravelly loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 7,000 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Tigeron and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Very gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**93F—Tigeron very gravelly loam,  
35 to 60 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Tigeron and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Loberg soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Very gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tolbert Series**

*Depth class:* Shallow  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Material derived from fine-grained igneous rocks  
*Slope range:* 8 to 60 percent  
*Elevation range:* 3,800 to 5,600 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 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, 1,900 feet south and 1,500 feet east of the northwest corner of sec. 21, T. 8 N., R. 8 W.

A—0 to 5 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; 30 percent stones and 15 percent cobbles; neutral; clear smooth boundary.

Bt—5 to 12 inches; dark reddish gray (5YR 4/2) 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 and 35 percent pebbles; slightly alkaline.

R—12 inches; fine-grained igneous bedrock.

**Range in Characteristics**

*Soil temperature:* 40 to 44 degrees F  
*Moisture control section:* Between depths of 4 and 12 inches  
*Thickness of the mollic epipedon:* 7 to 16 inches  
*Depth to the lithic contact:* 10 to 20 inches

*A horizon*

Hue: 5Y, 2.5Y, 10YR, or 7.5YR  
 Value: 3 to 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 25 percent  
 Coarse fragments: 35 to 60 percent—20 to  
 30 percent stones; 10 to 20 percent cobbles;  
 0 to 10 percent pebbles  
 Reaction: pH 6.1 to 7.8

*Bt horizon*

Hue: 2.5Y, 10YR, 7.5YR, or 5YR  
 Value: 3 to 6 dry; 2 to 4 moist  
 Chroma: 2 to 4  
 Texture: Clay loam, loam, or sandy clay loam  
 Clay content: 23 to 27 percent  
 Coarse fragments: 35 to 65 percent—15 to  
 30 percent cobbles; 20 to 35 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Trapps Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow to the Bk horizon,  
 moderate below

*Landform:* Mountains and moraines

*Parent material:* Colluvium derived from limestone  
 and calcareous argillite and alpine till

*Slope range:* 4 to 80 percent

*Elevation range:* 4,000 to 6,500 feet

*Annual precipitation:* 18 to 25 inches

*Annual air temperature:* 38 to 42 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, 2,300 feet north and 2,100 feet  
 east of the southwest corner of sec. 15, T. 14 N.,  
 R. 10 W.

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

E—0 to 6 inches; light gray (10YR 7/2) channery  
 loam, brown (10YR 5/3) moist; moderate medium  
 granular structure; soft, very friable, nonsticky,  
 nonplastic; many very fine and fine and common  
 coarse roots; many very fine and fine irregular  
 pores; 5 percent flagstones and 20 percent  
 channers; neutral; gradual smooth boundary.

Bt1—6 to 15 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;  
 many very fine and fine and few medium roots;  
 many very fine and fine irregular pores; few faint  
 clay films on faces of peds; 5 percent flagstones  
 and 40 percent channers; slightly alkaline; clear  
 smooth boundary.

Bt2—15 to 23 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 flagstones and  
 45 percent channers; slightly alkaline; clear  
 smooth boundary.

Bk—23 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 flagstones and 50 percent  
 channers; disseminated lime with lime casts on  
 underside of coarse fragments; violently  
 effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 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 stones, flagstones, and cobbles;  
 15 to 25 percent pebbles 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 flagstones or cobbles; 35 to  
 50 percent pebbles 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—0 to 20 percent stones, flagstones, and cobbles; 35 to 50 percent pebbles or channers  
 Calcium carbonate equivalent: 10 to 40 percent  
 Reaction: pH 7.9 to 8.4

### **98E—Trapps gravelly loam, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,300 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Trapps and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 35 percent: 0 to 4 percent  
 Soils that have dark surfaces: 0 to 4 percent  
 Very gravelly soils: 0 to 3 percent  
 Soils that have a calcareous surface: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **98F—Trapps gravelly loam, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,300 to 6,200 feet

*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Trapps and similar soils: 85 percent

##### **Minor Components**

Soils that have slopes more than 60 percent: 0 to 4 percent  
 Soils that have dark surfaces: 0 to 4 percent  
 Very gravelly soils: 0 to 3 percent  
 Soils that have a calcareous surface: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **198E—Trapps-Yreka stony loams, 8 to 25 percent slopes**

#### **Setting**

*Landform:*  
 • Trapps—Moraines  
 • Yreka—Moraines  
*Slope:*  
 • Trapps—8 to 25 percent  
 • Yreka—8 to 25 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Trapps and similar soils: 45 percent  
 Yreka and similar soils: 40 percent

##### **Minor Components**

Bignell soils: 0 to 4 percent  
 Soils that have a calcareous surface: 0 to 4 percent

Soils that have bouldery surface layers: 0 to 4 percent  
 Soils that have slopes more than 25 percent: 0 to 3 percent

### Major Component Description

#### Trapps

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.3 inches

#### Yreka

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 298D—Trapps channery loam, 4 to 25 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 4 to 25 percent  
*Elevation:* 4,300 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Trapps and similar soils: 85 percent

#### Minor Components

Yreka soils: 0 to 5 percent  
 Soils that have slopes more than 15 percent: 0 to 5 percent  
 Bignell soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Channery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 298F—Trapps channery loam, 25 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 25 to 60 percent  
*Elevation:* 4,300 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Trapps and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 4 percent  
 Soils that are moderately deep: 0 to 4 percent  
 Yreka soils: 0 to 4 percent  
 Soils that have slopes more than 60 percent: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Channery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 298G—Trapps channery loam, 60 to 80 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 60 to 80 percent

*Elevation:* 4,300 to 6,200 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Trapps and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent

Soils that are moderately deep: 0 to 5 percent

Yreka soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Turrah Series

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Slow

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 3,800 to 5,000 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 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, 1,800 feet south and 2,000 feet west of the northeast corner of sec. 31, T. 13 N., R. 10 W.

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

A1—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; neutral; clear smooth boundary.

A2—8 to 12 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 and very plastic; common very fine and fine roots; common very fine and fine pores; neutral; clear smooth boundary.

Bg1—12 to 25 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 and very plastic; common very fine and fine roots; common very fine and fine pores; slightly alkaline; clear smooth boundary.

Bg2—25 to 38 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 and very plastic; common very fine and fine roots; common very fine pores; slightly alkaline; abrupt smooth boundary.

2Cg—38 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 and very plastic; 40 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Thickness of the mollic epipedon:* 24 to 48 inches

*Depth to the seasonal high water table:* 12 to 24 inches

**A1 horizon**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 2, 2.5, or 3 moist; 2 to 4 dry  
 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, 2.5, or 3 moist; 2 to 4 dry  
 Chroma: 1 or 2  
 Redox concentrations: 10YR 4/3, 10YR 4/4,  
 10YR 4/6, 10YR 5/6, 10YR 6/4, or 10YR 6/6  
 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: 2, 2.5, 3 to 5 moist; 4 to 6 dry  
 Chroma: 0 to 3  
 Redox concentrations: 10YR 4/4, 10YR 4/6,  
 10YR 5/6, 10YR 6/4, 10YR 6/6, or 7.5YR 5/6  
 Texture: Clay, silty clay, silty clay loam, or clay  
 loam  
 Clay content: 35 to 60 percent  
 Reaction: pH 6.6 to 7.8

**2Cg horizon**

Hue: 2.5Y or 5Y  
 Value: 4 or 5 moist; 4 to 6 dry  
 Chroma: 1 or 2  
 Redox concentrations: 10YR 6/6, 10YR 4/6, or  
 10YR 4/4  
 Texture: Sandy clay loam, sandy loam, or clay  
 loam  
 Clay content: 20 to 40 percent  
 Content of rock fragments: 35 to 60 percent  
 pebbles  
 Reaction: pH 6.6 to 7.8

## 649—Turrah silty clay loam, 0 to 4 percent slopes

### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,800 to 5,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Turrah and similar soils: 85 percent

#### Minor Components

Poronto soils: 0 to 5 percent  
 Very poorly drained soils: 0 to 5 percent  
 Soils that are calcareous throughout: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 7.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Varney Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 50 percent  
*Elevation range:* 4,000 to 5,800 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 90 to 105 days

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

### Typical Pedon

Varney loam, in an area of Varney-Con loams, 4 to 8 percent slopes, in an area of cropland, 600 feet south and 1,800 feet east of the northwest corner of sec. 30, T. 7 N., R. 9 W.

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

Bt—7 to 12 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to

moderate medium subangular blocky; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine tubular pores; many distinct dark brown (10YR 3/3) clay films on faces of peds; 5 percent pebbles; neutral; clear smooth boundary.

**Bk1**—12 to 16 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many fine roots; many fine tubular pores; 5 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**Bk2**—16 to 28 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; common fine roots; common very fine and fine tubular and irregular pores; 5 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk3**—28 to 60 inches; very pale brown (10YR 7/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; many fine tubular and irregular pores; 15 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 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 16 inches

*Depth to the Bk horizon:* 9 to 20 inches

#### *Ap horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam, loam, or sandy clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 5.6 to 7.3

#### *Bt horizon*

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 30 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.8

#### *Bk1 horizon*

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture: Sandy loam, loam, clay loam, or sandy clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

#### *Bk2 horizon*

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 3 or 4

Texture: Sandy loam, loam, or sandy clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

#### *Bk3 horizon*

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loamy sand stratified with loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 7.9 to 8.4

## **31B—Varney clay loam, 0 to 4 percent slopes**

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

### Composition

#### Major Components

Varney and similar soils: 85 percent

#### Minor Components

Sandy soils that are on summits: 0 to 10 percent  
Varney very gravelly loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 31C—Varney clay loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

#### Major Components

Varney and similar soils: 85 percent

#### Minor Components

Soils that have a very gravelly clay subsurface: 0 to 5 percent  
Varney cobbly loam on summits: 0 to 5 percent  
Soils that have a very gravelly loam subsurface: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 31D—Varney clay loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 90 to 105 days

#### Composition

#### Major Components

Varney and similar soils: 85 percent

#### Minor Components

Very cobbly loam soils: 0 to 10 percent  
Very gravelly soils that are on summits: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 36B—Varney-Con loams, 0 to 4 percent slopes

#### Setting

*Landform:*

- Varney—Alluvial fans and stream terraces
- Con—Alluvial fans and stream terraces

*Slope:*

- Varney—0 to 4 percent
- Con—0 to 4 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Varney and similar soils: 60 percent

Con and similar soils: 25 percent

##### Minor Components

Soils that are clayey throughout: 0 to 10 percent

Soils that are cobbly loam throughout: 0 to 5 percent

#### Major Component Description

##### Varney

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

##### Con

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 36C—Varney-Con loams, 4 to 8 percent slopes

#### Setting

*Landform:*

- Varney—Alluvial fans and stream terraces
- Con—Alluvial fans and stream terraces

*Slope:*

- Varney—4 to 8 percent
- Con—4 to 8 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Varney and similar soils: 60 percent

Con and similar soils: 25 percent

##### Minor Components

Soils that are clayey throughout: 0 to 10 percent

Soils that are very gravelly below 20 inches: 0 to 5 percent

#### Major Component Description

##### Varney

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

##### Con

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**36D—Varney-Con loams,  
8 to 15 percent slopes****Setting***Landform:*

- Varney—Alluvial fans and stream terraces
- Con—Alluvial fans and stream terraces

*Slope:*

- Varney—8 to 15 percent
- Con—8 to 15 percent

*Elevation:* 4,000 to 5,000 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 90 to 105 days**Composition****Major Components**

Varney and similar soils: 60 percent

Con and similar soils: 25 percent

**Minor Components**

Soils that are clayey throughout: 0 to 10 percent

Con cobbly loam: 0 to 5 percent

**Major Component Description****Varney***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 6.8 inches**Con***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**131E—Varney cobbly clay loam,  
15 to 35 percent slopes****Setting***Landform:* Alluvial fans*Slope:* 15 to 35 percent*Elevation:* 4,000 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 90 to 105 days**Composition****Major Components**

Varney and similar soils: 85 percent

**Minor Components**

Anaconda soils: 0 to 8 percent

Sixbeacon cobbly loam: 0 to 7 percent

**Major Component Description***Surface layer texture:* Cobbly clay loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**131F—Varney cobbly clay loam,  
35 to 50 percent slopes****Setting***Landform:* Alluvial fans*Slope:* 35 to 50 percent*Elevation:* 4,000 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 90 to 105 days**Composition****Major Components**

Varney and similar soils: 85 percent

**Minor Components**

Anaconda soils: 0 to 8 percent  
Sixbeacon cobbly loam: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**136E—Varney-Con complex,  
15 to 35 percent slopes****Setting***Landform:*

- Varney—Alluvial fans
- Con—Alluvial fans and stream terraces

*Slope:*

- Varney—15 to 35 percent
- Con—15 to 35 percent

*Elevation:* 4,000 to 5,800 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition****Major Components**

Varney and similar soils: 60 percent  
Con and similar soils: 25 percent

**Minor Components**

Soils that are clayey throughout: 0 to 8 percent  
Sixbeacon soils: 0 to 7 percent

**Major Component Description****Varney**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.5 inches

**Con**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**236B—Varney sandy clay loam,  
2 to 4 percent slopes****Setting**

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

**Composition****Major Components**

Varney and similar soils: 85 percent

**Minor Components**

Anaconda soils: 0 to 4 percent

Sixbeacon soils: 0 to 4 percent

Soils that have slopes more than 4 percent: 0 to 4 percent

Cetrack soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Sandy clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **236C—Varney sandy clay loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Anaconda soils: 0 to 4 percent

Sixbeacon soils: 0 to 4 percent

Soils that have slopes more than 8 percent: 0 to 4 percent

Cetrack soils: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Sandy clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **236D—Varney sandy clay loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Anaconda soils: 0 to 4 percent

Sixbeacon soils: 0 to 4 percent

Soils that have slopes more than 15 percent: 0 to 4 percent

Cetrack soils: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Sandy clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Available water capacity:* Mainly 7.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **331B—Varney clay loam, 0 to 4 percent slope, impacted**

#### **Setting**

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,000 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Sixbeacon soils: 0 to 8 percent

Beaverell soils: 0 to 7 percent

#### **Major Component Description**

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 336B—Varney-Anaconda loams, 0 to 4 percent slopes, impacted

#### Setting

*Landform:*

- Varney—Alluvial fans and stream terraces
- Anaconda—Alluvial fans and stream terraces

*Slope:*

- Varney—0 to 4 percent
- Anaconda—0 to 4 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Varney and similar soils: 60 percent

Anaconda and similar soils: 25 percent

##### Minor Components

Soils that are clayey throughout: 0 to 8 percent

Varney cobbly loam: 0 to 7 percent

#### Major Component Description

##### Varney

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

##### Anaconda

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 7.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 336C—Varney-Anaconda loams, 4 to 8 percent slopes, impacted

#### Setting

*Landform:*

- Varney—Alluvial fans and stream terraces
- Anaconda—Alluvial fans and stream terraces

*Slope:*

- Varney—4 to 8 percent
- Anaconda—4 to 8 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 90 to 105 days

#### Composition

##### Major Components

Varney and similar soils: 60 percent

Anaconda and similar soils: 25 percent

##### Minor Components

Soils that are clayey throughout: 0 to 8 percent

Soils that have a very gravelly loam subsoil: 0 to 7 percent

#### Major Component Description

##### Varney

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

##### Anaconda

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 7.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## W—Water

### Composition

#### Major Components

Water: 100 percent

#### Major Component Description

*Definition:* Areas of open water

## Wetsand Series

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderate to the 2C horizon, rapid 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:* 40 to 44 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.

Oe—3 inches to 0; decomposed organic matter.

A—0 to 6 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 pebbles; moderately alkaline; clear smooth boundary.

AC—6 to 13 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 pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—13 to 18 inches; light gray (10YR 7/2) 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; many very fine and fine and common medium roots; many fine irregular pores; 15 percent pebbles; violently effervescent; moderately alkaline; clear smooth boundary.

2C2—18 to 60 inches; white (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 and 30 percent pebbles; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the seasonal water table:* 12 to 24 inches

#### A horizon

Value: 3 or 4 moist; 4 to 6 dry

Chroma: 1 to 3

Clay content: 10 to 25 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 2 to 8 mmhos/cm

Reaction: pH 7.4 to 9.0

#### AC horizon

Value: 5 or 6 dry

Chroma: 2 or 3

Texture: Loam, silt loam, or sandy loam

Clay content: 5 to 20 percent

Content of rock fragments: 0 to 25 percent pebbles

Electrical conductivity: 2 to 8 mmhos/cm

Reaction: pH 7.4 to 8.4

#### C1 horizon

Value: 4 or 5 moist; 5 to 7 dry

Chroma: 2 or 3

Redox features: Common or many; distinct or prominent; 2.5YR 4/4, 5YR 6/6, or 5YR 6/4

Clay content: 5 to 20 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

#### 2C2 horizon

Value: 4, 5, or 7 moist; 5, 7, or 8 dry

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 pebbles  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Reaction: pH 7.4 to 8.4

## Whitecow Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Colluvium derived from limestone  
*Slope range:* 15 to 80 percent  
*Elevation range:* 4,400 to 6,200 feet  
*Annual precipitation:* 18 to 25 inches  
*Annual air temperature:* 38 to 42 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid  
 Typic Calcicustepts

### Typical Pedon

Whitecow gravelly loam, dry, 15 to 35 percent slopes, in an area of woodland, 2,200 feet north and 2,300 feet east of the southwest corner of sec. 25, T. 10 N., R. 7 W.

- Oi—1 inch to 0; partially decomposed forest litter.  
 A—0 to 2 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; few fine irregular pores; 5 percent cobbles and 25 percent pebbles; slightly effervescent; slightly alkaline; clear wavy boundary.  
 Bk1—2 to 8 inches; brown (10YR 5/3) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; few fine irregular pores; 5 percent cobbles and 35 percent pebbles; few faint lime casts on bottom of coarse fragments; strongly effervescent; slightly alkaline; clear wavy boundary.  
 Bk2—8 to 18 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine and few medium and coarse roots; few fine irregular pores; 5 percent cobbles and 40 percent pebbles; few faint lime casts on all sides of coarse

fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

- Bk3—18 to 26 inches; light yellowish brown (10YR 6/4) very gravelly loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; few fine irregular pores; 10 percent cobbles and 35 percent pebbles; common distinct lime casts on all sides of coarse fragments; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.  
 Bk4—26 to 60 inches; pale brown (10YR 6/3) extremely cobbly loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine, fine, and medium roots; few fine irregular pores; 30 percent cobbles and 40 percent pebbles; many prominent lime casts on all sides of coarse fragments; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristic

*Soil temperature:* 38 to 42 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

#### A horizon

Value: 4 or 5 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 pebbles

Calcium carbonate equivalent: 5 to 45 percent

Reaction: pH 7.4 to 8.4

#### Bk1 and Bk2 horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 30 percent stones and cobbles; 5 to 60 percent pebbles or channers

Calcium carbonate equivalent: 40 to 50 percent

Reaction: pH 7.4 to 9.0

#### Bk3 horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture: Loam, sandy loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 75 percent—  
10 to 15 percent stones and cobbles; 25 to  
60 percent pebbles  
Calcium carbonate equivalent: 40 to 50 percent  
Reaction: pH 7.4 to 9.0

**Bk4 horizon**

Hue: 10YR or 2.5Y  
Value: 6 to 8 dry; 4 to 7 moist  
Chroma: 2 to 4  
Texture: Loam, sandy loam, or clay loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 60 to 90 percent—5 to  
30 percent stones and cobbles; 55 to  
70 percent pebbles or channers  
Calcium carbonate equivalent: 40 to 50 percent  
Reaction: pH 7.4 to 9.0

**88E—Whitecow gravelly loam, dry,  
15 to 35 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Whitecow and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
Soils that have slopes more than 35 percent: 0 to  
7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**88F—Whitecow gravelly loam, dry,  
35 to 60 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Whitecow and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
Soils that are moderately deep: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**88G—Whitecow gravelly loam, dry,  
60 to 80 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 60 to 80 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Whitecow and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 5 percent  
Soils that have a clayey subsoil: 0 to 5 percent  
Very gravelly clayey soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 488E—Whitecow gravelly loam, cool, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Whitecow and similar soils: 85 percent

##### Minor Components

Soils that are less than 60-inches deep: 0 to 8 percent  
 Areas of rock outcrop: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 488F—Whitecow gravelly loam, cool, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Whitecow and similar soils: 85 percent

##### Minor Components

Soils that are less than 60-inches deep: 0 to 8 percent  
 Areas of rock outcrop: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 488G—Whitecow gravelly loam, cool, 60 to 80 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 60 to 80 percent  
*Elevation:* 4,000 to 6,200 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Whitecow and similar soils: 85 percent

**Minor Components**

Soils that are less than 60-inches deep: 0 to 8 percent

Areas of rock outcrop: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**788F—Whitecow, cool-Rock outcrop complex, 35 to 60 percent slopes****Setting**

*Landform:*

- Whitecow—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 6,200 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Whitecow and similar soils: 65 percent

Rock outcrop: 20 percent

**Minor Components**

Trapps soils: 0 to 5 percent

Soils that are shallow to bedrock: 0 to 5 percent

Yreka soils: 0 to 5 percent

**Major Component Description****Whitecow**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**988F—Whitecow-Rock outcrop complex, 35 to 60 percent slopes****Setting**

*Landform:*

- Whitecow—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 6,200 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Whitecow and similar soils: 55 percent

Rock outcrop: 30 percent

**Minor Components**

Soils that are moderately deep: 0 to 4 percent

Yreka soils: 0 to 4 percent

Soils that have slopes more than 60 percent: 0 to 4 percent

Very gravelly loamy soils: 0 to 3 percent

**Major Component Description****Whitecow**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 988G—Whitecow-Rock outcrop complex, 60 to 80 percent slopes

### Setting

#### Landform:

- Whitecow—Mountains
- Rock outcrop—Mountains

*Slope:* 60 to 80 percent

*Elevation:* 4,400 to 6,200 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Whitecow and similar soils: 55 percent

Rock outcrop: 30 percent

#### Minor Components

Soils that are moderately deep: 0 to 4 percent

Yreka soils: 0 to 4 percent

Soils that have slopes more than 80 percent: 0 to 4 percent

Very gravelly loamy soils: 0 to 3 percent

### Major Component Description

#### Whitecow

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Whitlash Series

*Depth class:* Shallow

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains

*Parent material:* Igneous residuum

*Slope range:* 15 to 60 percent

*Elevation range:* 3,800 to 5,000 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

### Typical Pedon

Whitlash very stony loam, in an area of Perma-Whitlash-Rock outcrop complex, 35 to 60 percent slopes, in an area of rangeland, 1,600 feet south and 1,600 feet east of the northwest corner of sec. 11, T. 10 N., R. 7 W.

A—0 to 5 inches; dark brown (10YR 4/3) very stony loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; many very fine interstitial pores; 15 percent stones, 10 percent cobbles, and 20 percent pebbles; slightly acid; clear smooth boundary.

Bw—5 to 17 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores; 10 percent stones, 30 percent cobbles, and 15 percent pebbles; neutral.

R—17 inches; igneous bedrock.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; and moist in all parts April, May, and June

*Depth to bedrock:* 10 to 20 inches

*A horizon*

Value: 3 or 4 dry; 2 or 3 moist  
 Chroma: 1 to 3  
 Clay content: 18 to 27 percent, with less than 35 percent fine and coarser sand  
 Content of rock fragments: 35 to 60 percent—10 to 30 percent stones, flagstones, and cobbles; 15 to 35 percent pebbles or channers  
 Reaction: pH 6.1 to 7.3

*Bw horizon*

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Texture: Loam, sandy clay loam, or sandy loam  
 Clay content: 18 to 27 percent, with less than 35 percent fine and coarser sand  
 Content of rock fragments: 35 to 80 percent—5 to 50 percent stones, flagstones and cobbles; 15 to 60 percent pebbles or channers  
 Reaction: pH 6.6 to 7.3

**Whitore Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains

*Parent material:* Colluvium derived from limestone

*Slope range:* 15 to 60 percent

*Elevation range:* 5,200 to 7,200 feet

*Annual precipitation:* 20 to 26 inches

*Annual air temperature:* 35 to 38 degrees F

*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, carbonatic Typic Eutrocrypts

**Typical Pedon**

Whitore gravelly loam, 35 to 60 percent slopes, in an area of woodland, 2,000 feet north and 1,200 feet west of the southeast corner of sec. 5, T. 11 N., R. 11 W.

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

A—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; 5 percent cobbles and 20 percent pebbles; strongly effervescent; neutral; clear smooth boundary.

Bw—2 to 8 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine, fine, medium, and coarse roots; common very fine and fine irregular pores; 10 percent cobbles and 20 percent pebbles; violently effervescent; slightly alkaline; clear smooth boundary.

Bk1—8 to 20 inches; very pale brown (10YR 7/3) 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 and few medium and coarse roots; common very fine irregular pores; 15 percent cobbles and 35 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—20 to 60 inches; light gray (10YR 7/2) extremely cobbly loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine irregular pores; 30 percent cobbles and 35 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 38 to 42 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the Bk horizon:* 5 to 15 inches

*A horizon*

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 1 to 3

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 6.6 to 7.8

*Bw horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay loam or loam

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 60 percent—10 to 25 percent stones and cobbles; 5 to 35 percent pebbles or channers

Effervescence: Slightly to violently in the lower half

Reaction: pH 7.4 to 9.0

*Bk horizons*

Hue: 10YR or 2.5Y  
 Value: 6 to 8 dry; 4 to 7 moist  
 Chroma: 2 to 4  
 Texture: Clay loam or loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 35 to 85 percent—0 to 40 percent stones and cobbles; 25 to 45 percent pebbles or channers  
 Calcium carbonate equivalent: 40 to 50 percent  
 Reaction: pH 7.4 to 9.0

**92E—Whitore gravelly loam,  
 15 to 35 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,200 to 7,200 feet  
*Mean annual precipitation:* 20 to 26 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Whitore and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Soils that have slopes more than 35 percent: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**92F—Whitore gravelly loam,  
 35 to 60 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,200 to 7,200 feet  
*Mean annual precipitation:* 20 to 26 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Whitore and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent  
 Soils that are 10 to 60 inches to rock: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Wildgen Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Moraines  
*Parent material:* Alpine till  
*Slope range:* 2 to 50 percent  
*Elevation range:* 4,000 to 5,000 feet  
*Annual precipitation:* 18 to 24 inches  
*Annual air temperature:* 38 to 42 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

### Typical Pedon

Wildgen gravelly loam, in an area of Wildgen-Yreka gravelly loams, 8 to 25 percent slopes, in an area of woodland, 400 feet north and 2,350 feet west of the southeast corner of sec. 15, T. 15 N., R. 12 W.

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

E1—0 to 8 inches; pale brown (10YR 6/3) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent pebbles; slightly acid; clear smooth boundary.

E2—8 to 15 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure parting to moderate medium granular structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine, fine, medium, and coarse roots; many fine pores; 40 percent pebbles; slightly acid; gradual wavy boundary.

E and Bt—15 to 60 inches; 75 percent is pink (7.5YR 7/4) very cobbly loam, brown (7.5YR 5/4) moist (E part); 25 percent is strong brown (7.5YR 4/6) very cobbly loam lamellae <sup>1</sup>/<sub>4</sub>- to <sup>3</sup>/<sub>8</sub>-inch thick, dark brown (7.5YR 4/4) moist (B part); weak medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine, fine, and medium roots; common fine pores; 5 percent stones, 15 percent cobbles, and 35 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

#### E1 horizon

Hue: 10YR or 7.5YR

Value: 6 or 7 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

#### E2 horizon

Hue: 10YR or 7.5YR

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 1 to 4

Texture: Loam or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 60 percent—0 to 20 percent stones and cobbles; 30 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

#### E and Bt horizon

Hue: E part—10YR or 7.5YR; B part—10YR or 7.5YR

Value: E part—6 to 8 dry, 5 to 7 moist; B part 4 to 7 dry, 3 to 5 moist

Chroma: E part—1 to 4; B part—3, 4, or 6

Texture: Loam or sandy loam

Clay content: 10 to 25 percent; lamellae have less than 3 percent increase in clay

Content of rock fragments: 40 to 60 percent—0 to 20 percent stones and cobbles; 35 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

## 371C—Wildgen-Yreka gravelly loams, 2 to 8 percent slopes

### Setting

#### Landform:

- Wildgen—Moraines
- Yreka—Moraines

#### Slope:

- Wildgen—2 to 8 percent
- Yreka—2 to 8 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Wildgen and similar soils: 55 percent

Yreka and similar soils: 30 percent

#### Minor Components

Poorly drained soils: 0 to 4 percent

Soils that have a thick volcanic ash surface: 0 to 4 percent

Very gravelly sandy soils: 0 to 3 percent

Soils that have slopes more than 8 percent: 0 to 4 percent

### Major Component Description

#### Wildgen

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

### **Yreka**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **371E—Wildgen-Yreka gravelly loams, 8 to 25 percent slopes**

### **Setting**

*Landform:*

- Wildgen—Moraines
- Yreka—Moraines

*Slope:*

- Wildgen—8 to 25 percent
- Yreka—8 to 25 percent

*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Wildgen and similar soils: 55 percent  
 Yreka and similar soils: 30 percent

#### **Minor Components**

Poorly drained soils: 0 to 4 percent  
 Soils that have a thick volcanic ash surface: 0 to 4 percent  
 Very gravelly sandy soils: 0 to 3 percent  
 Soils that have slopes more than 25 percent: 0 to 4 percent

### **Major Component Description**

#### **Wildgen**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

### **Yreka**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **371F—Wildgen-Yreka gravelly loams, 25 to 50 percent slopes**

### **Setting**

*Landform:*

- Wildgen—Moraines
- Yreka—Moraines

*Slope:*

- Wildgen—25 to 50 percent
- Yreka—25 to 50 percent

*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

### **Composition**

#### **Major Components**

Wildgen and similar soils: 55 percent  
 Yreka and similar soils: 30 percent

#### **Minor Components**

Poorly drained soils: 0 to 4 percent  
 Soils that have a thick volcanic ash surface: 0 to 4 percent  
 Very gravelly sandy soils: 0 to 3 percent  
 Soils that have slopes more than 50 percent: 0 to 4 percent

### **Major Component Description**

#### **Wildgen**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

### **Yreka**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Windham Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Colluvium derived from limestone  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,000 to 5,800 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 44 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid  
 Typic Calcicustolls

### **Typical Pedon**

Windham gravelly loam, in an area of Windham-Lap gravelly loams, 35 to 60 percent slopes, in an area of rangeland, 2,150 feet south and 1,600 feet east of the northwest corner of sec. 5, T. 9 N., R. 6 W.

A—0 to 9 inches; dark brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine discontinuous pores; 5 percent cobbles and 25 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk1—9 to 16 inches; dark brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and few fine and medium roots; many very fine and fine discontinuous pores; 10 percent cobbles and 30 percent pebbles; disseminated lime; common distinct lime casts on bottom of coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—16 to 29 inches; brown (10YR 5/3) extremely gravelly loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and few fine and medium roots; many very fine and fine discontinuous pores; 10 percent cobbles and 55 percent pebbles; disseminated lime; common distinct lime casts on bottom of coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—29 to 60 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; many very fine and common fine discontinuous pores; 20 percent cobbles and 55 percent pebbles; disseminated lime; common distinct lime casts on bottom of coarse fragments; violently effervescent; moderately alkaline.

### **Range in Characteristics**

*Soil temperature:* 41 to 46 degrees F  
*Thickness of the mollic epipedon:* 7 to 16 inches  
*Depth to the calcic horizon:* 5 to 10 inches

#### *A horizon*

Hue: 7.5YR or 10YR  
 Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 1 to 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

#### *Bk1 horizon*

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

Calcium carbonate equivalent: 35 to 60 percent  
Reaction: pH 7.9 to 8.4

*Bk2 horizon*

Hue: 7.5YR, 10YR, or 2.5Y  
Value: 5 to 8 dry; 4 to 7 moist  
Chroma: 2 to 4  
Texture: Loam, clay loam, or sandy loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 35 to 75 percent—0 to 20 percent cobbles; 35 to 55 percent pebbles  
Calcium carbonate equivalent: 40 to 60 percent  
Reaction: pH 7.9 to 8.4

*Bk3 horizon*

Hue: 7.5YR, 10YR, or 2.5Y  
Value: 5 to 8 dry; 4 to 7 moist  
Chroma: 2 to 4  
Texture: Loam, clay loam, or sandy loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 60 to 80 percent—5 to 20 percent cobbles; 55 to 60 percent pebbles  
Calcium carbonate equivalent: 40 to 60 percent  
Reaction: pH 7.9 to 8.4

**42E—Windham gravelly loam,  
15 to 35 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Windham and similar soils: 85 percent

**Minor Components**

Soils that are moderately deep to deep: 0 to 10 percent  
Soils that have slopes more than 35 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**42F—Windham gravelly loam,  
35 to 60 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,000 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Windham and similar soils: 85 percent

**Minor Components**

Soils that are moderately deep to deep: 0 to 10 percent  
Soils that have slopes more than 60 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**839E—Windham-Lap gravelly loams,  
15 to 35 percent slopes**

**Setting**

*Landform:*  
• Windham—Mountains  
• Lap—Mountains

*Slope:*

- Windham—15 to 35 percent
- Lap—15 to 35 percent

*Elevation:* 4,000 to 5,800 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 70 to 90 days**Composition****Major Components**

Windham and similar soils: 65 percent

Lap and similar soils: 20 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent

Soils that have slopes more than 35 percent: 0 to 7 percent

**Major Component Description****Windham***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 3.4 inches**Lap***Surface layer texture:* Gravelly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**839F—Windham-Lap gravelly loams,  
35 to 60 percent slopes****Setting***Landform:*

- Windham—Mountains
- Lap—Mountains

*Slope:*

- Windham—35 to 60 percent
- Lap—35 to 60 percent

*Elevation:* 4,000 to 5,800 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 70 to 90 days**Composition****Major Components**

Windham and similar soils: 65 percent

Lap and similar soils: 20 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent

Soils that have slopes more than 60 percent: 0 to 7 percent

**Major Component Description****Windham***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 3.4 inches**Lap***Surface layer texture:* Gravelly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Winfall Series***Depth class:* Very deep*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Moraines*Parent material:* Alpine till*Slope range:* 2 to 50 percent*Elevation range:* 4,000 to 5,000 feet

*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 38 to 42 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Eutrudepts

### Typical Pedon

Winfall gravelly loam, 2 to 8 percent slopes, in an area of woodland, 700 feet south and 1,300 feet east of the northwest corner of sec. 11, T. 15 N., R. 12 W.

Oe—3 inches to 0; decomposed and slightly decomposed twigs and needles.

E—0 to 16 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many very fine, fine, and medium and few coarse roots; many fine interstitial pores; 5 percent cobbles and 25 percent pebbles; slightly acid; clear smooth boundary.

E and Bt—16 to 60 inches; 70 percent is light gray (10YR 7/2) very gravelly coarse sandy loam, brown (10YR 5/3) moist (E part); 30 percent is light yellowish brown (10YR 6/4) fine sandy loam lamellae  $\frac{1}{8}$ - to  $\frac{3}{8}$ -inch thick, brown (10YR 4/3) moist (B part); texture mixed is very gravelly sandy loam; weak medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine interstitial pores; 10 percent cobbles and 45 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 42 to 46 degrees F  
*Moisture control section:* Between depths of 8 and 24 inches

#### E horizon

Hue: 5YR, 7.5YR, or 10YR  
 Value: 5 to 7 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 10 to 20 percent  
 Content of rock fragments: 35 to 60 percent—0 to 5 percent stones and cobbles; 15 to 30 percent pebbles  
 Reaction: pH 5.1 to 6.5

#### E and Bt horizon

Hue: E part—5YR, 7.5YR, or 10YR; B part—5YR, 7.5YR, or 10YR  
 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—3 or 4

Texture: Loam, fine sandy loam, sandy loam, or coarse sandy loam  
 Clay content: 10 to 20 percent; lamellae have less than 3 percent increase in clay  
 Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent pebbles  
 Reaction: pH 5.1 to 6.5

### 71C—Winfall gravelly loam, 2 to 8 percent slopes

#### Setting

*Landform:* Moraines  
*Slope:* 2 to 8 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Winfall and similar soils: 85 percent

##### Minor Components

Yreka soils: 0 to 6 percent  
 Soils that have slopes more than 8 percent: 0 to 6 percent  
 Poorly drained soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 71E—Winfall gravelly loam, 8 to 25 percent slopes

#### Setting

*Landform:* Moraines  
*Slope:* 8 to 25 percent

*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winfall and similar soils: 85 percent

#### Minor Components

Yreka soils: 0 to 10 percent  
 Poorly drained soils: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 71F—Winfall gravelly loam, 25 to 50 percent slopes

### Setting

*Landform:* Moraines  
*Slope:* 25 to 50 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winfall and similar soils: 85 percent

#### Minor Components

Yreka soils: 0 to 6 percent  
 Soils that have slopes more than 60 percent: 0 to 6 percent  
 Poorly drained soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 171C—Winfall-Rumblecreek gravelly loams, 2 to 8 percent slopes

### Setting

*Landform:*  
 • Winfall—Moraines  
 • Rumblecreek—Moraines  
*Slope:*  
 • Winfall—2 to 8 percent  
 • Rumblecreek—2 to 8 percent  
*Elevation:* 4,000 to 4,700 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winfall and similar soils: 60 percent  
 Rumblecreek and similar soils: 25 percent

#### Minor Components

Crow soils: 0 to 5 percent  
 Poorly drained soils: 0 to 4 percent  
 Areas of open water: 0 to 3 percent  
 Soils that have a thick volcanic ash surface: 0 to 3 percent

### Major Component Description

#### Winfall

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.9 inches

#### Rumblecreek

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 171E—Winfall-Rumblecreek gravelly loams, 8 to 25 percent slopes

### Setting

*Landform:*

- Winfall—Moraines
- Rumblecreek—Moraines

*Slope:*

- Winfall—8 to 25 percent
- Rumblecreek—8 to 25 percent

*Elevation:* 4,000 to 4,700 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winfall and similar soils: 60 percent

Rumblecreek and similar soils: 25 percent

#### Minor Components

Poorly drained soils: 0 to 5 percent

Bignell soils: 0 to 5 percent

Soils that have a thick volcanic ash surface: 0 to 5 percent

### Major Component Description

#### Winfall

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.9 inches

#### Rumblecreek

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 171F—Winfall-Rumblecreek gravelly loams, 25 to 50 percent slopes

### Setting

*Landform:*

- Winfall—Moraines
- Rumblecreek—Moraines

*Slope:*

- Winfall—25 to 50 percent
- Rumblecreek—25 to 50 percent

*Elevation:* 4,000 to 4,700 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winfall and similar soils: 60 percent

Rumblecreek and similar soils: 25 percent

#### Minor Components

Somewhat poorly drained soils: 0 to 4 percent

Soils that have slopes more than 50 percent: 0 to 4 percent

Bignell soils: 0 to 4 percent

Poorly drained soils: 0 to 3 percent

### Major Component Description

#### Winfall

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.9 inches

#### Rumblecreek

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Winkler Series

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderately rapid

*Landform:* Mountains

*Parent material:* Colluvium derived from argillite and quartzite

*Slope range:* 8 to 80 percent

*Elevation range:* 4,400 to 6,500 feet

*Annual precipitation:* 18 to 24 inches

*Annual air temperature:* 38 to 42 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, 1,600 feet south and 2,400 feet west of the northeast corner of sec. 7, T. 12 N., R. 9 W.

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

A—0 to 3 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 pores; 30 percent angular pebbles; neutral; clear smooth boundary.

E1—3 to 13 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 pores; 30 percent angular pebbles; moderately acid; gradual wavy boundary.

E2—13 to 26 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 pores; 10 percent angular cobbles and 40 percent angular pebbles; moderately acid; gradual wavy boundary.

E and Bt—26 to 41 inches; 75 percent is pinkish white (7.5YR 8/2) extremely gravelly sandy loam, brown (7.5YR 5/4) moist (E part); 25 percent is brown (7.5YR 5/4) fine sandy loam lamellae  $\frac{1}{8}$ - to  $\frac{1}{4}$ -inch thick, brown (7.5YR 4/4) moist (B part); weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few fine and medium roots; common very fine and fine pores; 20 percent angular cobbles and 50 percent angular pebbles; moderately acid; gradual wavy boundary.

C—41 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 pores; 20 percent angular cobbles and 55 percent angular pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between depths of 8 and 24 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 moist

Chroma: 2 or 3

Clay content: 7 to 15 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent angular cobbles; 15 to 30 percent angular pebbles

Reaction: pH 6.1 to 7.3

#### E1 horizon

Hue: 7.5YR or 10YR

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture: Sandy loam or loam

Clay content: 5 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent angular cobbles; 15 to 55 percent angular pebbles

Reaction: pH 6.1 to 7.3

#### E2 horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture: Sandy loam or loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 70 percent—0 to 10 percent angular cobbles; 35 to 60 percent angular pebbles

Reaction: pH 5.6 to 7.3

*E and Bt horizon*

Hue: E part—2.5Y, 10YR, or 7.5YR; B part—2.5Y, 10YR, 7.5YR, or 5YR

Value: E part—6 to 8 dry, 5 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: Fine sandy loam, sandy loam, or loam

Clay content: 5 to 15 percent; lamellae have less than 5 percent increase in clay

Content of rock fragments: 60 to 85 percent—10 to 25 percent angular cobbles; 50 to 60 percent angular pebbles

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 pebbles

Reaction: pH 5.6 to 6.5

**86D—Winkler gravelly loam,  
8 to 15 percent slopes**

**Setting**

*Landform:* Mountains

*Slope:* 8 to 15 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Winkler and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent

Bignell soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**86E—Winkler gravelly loam,  
15 to 35 percent slopes**

**Setting**

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Winkler and similar soils: 85 percent

**Minor Components**

Areas of rock outcrop: 0 to 8 percent

Bignell soils: 0 to 7 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**86F—Winkler gravelly loam,  
35 to 60 percent slopes**

**Setting**

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Bignell soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 86G—Winkler gravelly loam, 60 to 80 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 60 to 80 percent  
*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 8 percent

Bignell soils: 0 to 7 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 786D—Winkler gravelly loam, cool, 8 to 15 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 5 percent

Yreka soils: 0 to 5 percent

Soils that are shallow to bedrock: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### **786E—Winkler gravelly loam, cool, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Winkler and similar soils: 85 percent

##### **Minor Components**

Areas of rock outcrop: 0 to 5 percent  
 Soils that are shallow to bedrock: 0 to 5 percent  
 Yreka soils: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **786F—Winkler gravelly loam, cool, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Winkler and similar soils: 85 percent

##### **Minor Components**

Areas of rock outcrop: 0 to 5 percent  
 Soils that are shallow to bedrock: 0 to 5 percent  
 Yreka soils: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **786G—Winkler gravelly loam, cool, 60 to 80 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 60 to 80 percent  
*Elevation:* 4,400 to 6,500 feet  
*Mean annual precipitation:* 18 to 24 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Winkler and similar soils: 85 percent

##### **Minor Components**

Areas of rock outcrop: 0 to 5 percent  
 Soils that are shallow to bedrock: 0 to 5 percent  
 Yreka soils: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 886E—Winkler-Rubble land-Rock outcrop complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Winkler—Mountains
- Rubble land—Mountains
- Rock outcrop—Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 50 percent

Rubble land: 20 percent

Rock outcrop: 15 percent

#### Minor Components

Soils that have slopes more than 35 percent: 0 to 5 percent

Whitecow soils: 0 to 5 percent

Tevis soils: 0 to 5 percent

### Major Component Description

#### Winkler

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

#### Rubble land

*Definition:* Areas having more than 90 percent boulders, stones, and cobbles on the surface, supporting little or no vegetation

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 886F—Winkler-Rubble land-Rock outcrop complex, 35 to 60 percent slopes

### Setting

#### *Landform:*

- Winkler—Mountains
- Rubble land—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 50 percent

Rubble land: 20 percent

Rock outcrop: 15 percent

#### Minor Components

Soils that have slopes more than 35 percent: 0 to 5 percent

Bignell soils: 0 to 5 percent

Whitecow soils: 0 to 5 percent

### Major Component Description

#### Winkler

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

#### Rubble land

*Definition:* Areas having more than 90 percent boulders, stones, and cobbles on the surface, supporting little or no vegetation

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 886G—Winkler-Rubble land-Rock outcrop complex, 60 to 80 percent slopes

### Setting

#### Landform:

- Winkler—Mountains
- Rubble land—Mountains
- Rock outcrop—Mountains

*Slope:* 60 to 80 percent

*Elevation:* 4,400 to 6,500 feet

*Mean annual precipitation:* 18 to 24 inches

*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winkler and similar soils: 50 percent

Rubble land: 20 percent

Rock outcrop: 15 percent

#### Minor Components

Soils that have slopes more than 80 percent: 0 to 5 percent

Whitecow soils: 0 to 5 percent

Tevis soils: 0 to 5 percent

### Major Component Description

#### Winkler

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Somewhat excessively drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

#### Rubble land

*Definition:* Areas having more than 90 percent boulders, stones, and cobbles on the surface, supporting little or no vegetation

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Winspect Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Moraines and alluvial fans

*Parent material:* Alluvium and alpine till

*Slope range:* 2 to 60 percent

*Elevation range:* 3,800 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 44 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Winspect gravelly loam, 8 to 15 percent slopes, in an area of rangeland, 2,100 feet north and 1,000 feet east of the southwest corner of sec. 9, T. 10 N., R. 7 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, black (10YR 2/1) moist; weak fine granular structure; soft, friable, nonsticky, nonplastic; many very fine, common fine, and few medium roots; many very fine discontinuous interstitial pores; 5 percent cobbles and 15 percent pebbles; slightly effervescent; moderately alkaline; clear smooth boundary.

Ak—5 to 11 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak fine granular structure; soft, very friable, slightly sticky, nonplastic; common very fine and few fine and medium roots; common very fine discontinuous interstitial pores; 10 percent cobbles and 40 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—11 to 20 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft,

very friable, slightly sticky, nonplastic; common very fine and few fine and medium roots; common very fine discontinuous interstitial pores; 10 percent cobbles and 50 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

**Bk2**—20 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine and few fine and medium roots; common very fine discontinuous interstitial pores; 10 percent cobbles and 35 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*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 35 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 10 to 15 percent pebbles

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 60 percent—5 to 20 percent cobbles; 10 to 40 percent pebbles

Calcium carbonate equivalent: 10 to 40 percent

Reaction: pH 7.4 to 8.4

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles; 30 to 50 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 8.4

#### Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 8.4

### 39C—Winspect gravelly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans

*Slope:* 4 to 8 percent

*Elevation:* 4,400 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Winspect and similar soils: 85 percent

##### Minor Components

Soils that have slopes more than 15 percent: 0 to 5 percent

Winspect cobbly loam: 0 to 4 percent

Soils that are moderately deep: 0 to 3 percent

Areas of rock outcrop: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 39D—Winspect gravelly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 4,400 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winspect and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 15 percent: 0 to 5 percent

Winspect cobbly loam: 0 to 4 percent

Soils that are moderately deep: 0 to 3 percent

Areas of rock outcrop: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 39E—Winspect gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 15 to 35 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winspect and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 35 percent: 0 to 5 percent

Winspect cobbly loam: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Soils that are moderately deep: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 39F—Winspect gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Alluvial fans  
*Slope:* 35 to 60 percent  
*Elevation:* 4,400 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 70 to 90 days

### Composition

#### Major Components

Winspect and similar soils: 85 percent

#### Minor Components

Soils that have slopes more than 60 percent: 0 to 5 percent

Winspect cobbly loam: 0 to 4 percent

Areas of rock outcrop: 0 to 3 percent

Moderately deep soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Worock Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Colluvium derived from volcanic rock and argillite

*Slope range:* 8 to 60 percent

*Elevation range:* 4,600 to 7,500 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 35 to 38 degrees F

*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

## Typical Pedon

Worock gravelly loam, in an area of Worock, cool-Loberg complex, 8 to 15 percent slopes, in an area of woodland, 1,930 feet south and 2,285 feet east of the northwest corner of sec. 21, T. 12 N., R. 10 W.

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

E1—0 to 5 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky, nonplastic; many medium and coarse and few very fine roots; many very fine and fine irregular pores; 15 percent pebbles; strongly acid; clear wavy boundary.

E2—5 to 18 inches; light gray (10YR 7/2) cobbly loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure parting to moderate fine granular structure; soft, friable, nonsticky, nonplastic; many fine and medium and few very fine roots; common very fine and fine tubular pores; 15 percent cobbles and 20 percent pebbles; moderately acid; gradual wavy boundary.

E/Bt—18 to 23 inches; 85 percent is pinkish gray (7.5YR 7/2) very cobbly loam, brown (7.5YR 5/4) moist (E part); 15 percent is brown (7.5YR 5/4) very cobbly clay loam, brown (7.5YR 4/4) moist (B part); moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine and common fine and medium roots; common very fine and fine discontinuous pores; 5 percent stones,

15 percent cobbles, and 25 percent pebbles; moderately acid; clear wavy boundary.

Bt1—23 to 38 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common fine and medium roots; few very fine and fine discontinuous pores; common distinct clay films on faces of peds; 5 percent stones, 15 percent cobbles, and 40 percent pebbles; moderately acid; clear wavy boundary.

Bt2—38 to 60 inches; brown (7.5YR 5/4) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; hard, very firm, moderately sticky and moderately plastic; few fine and medium roots; few very fine and fine discontinuous pores; many distinct clay films on faces of peds; 5 percent stones, 15 percent cobbles, and 40 percent pebbles; moderately acid.

## Range in Characteristics

*Soil temperature:* 37 to 45 degrees F

*Moisture control section:* Between depths of 4 and 12 inches; never dry in all parts when not frozen

### E horizons

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 2 to 4 or 6

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 15 percent cobbles; 15 to 20 percent pebbles

Reaction: pH 5.1 to 6.5

### E/Bt horizon

Hue: E part—10YR or 7.5YR; B part—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, 5, or 6; B part—4 or 6

Texture: E part—loam or sandy loam; B part—clay loam; mixed—loam or clay loam

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 pebbles

Reaction: pH 5.1 to 6.5

### Bt horizons

Hue: 10YR or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 4 or 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 pebbles  
 Reaction: pH 5.6 to 6.5

**96D—Worock gravelly loam, cool,  
 8 to 15 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Worock and similar soils: 85 percent

**Minor Components**

Soils that are shallow: 0 to 4 percent  
 Evaro soils: 0 to 3 percent  
 Danaher soils: 0 to 4 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**96E—Worock gravelly loam, cool,  
 15 to 35 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Worock and similar soils: 85 percent

**Minor Components**

Soils that are shallow: 0 to 4 percent  
 Evaro soils: 0 to 3 percent  
 Danaher soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**96F—Worock gravelly loam, cool,  
 35 to 60 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition**

**Major Components**

Worock and similar soils: 85 percent

**Minor Components**

Soils that are shallow: 0 to 4 percent  
 Evaro soils: 0 to 3 percent  
 Danaher soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 196E—Worock-Loberg complex, 15 to 35 percent slopes

### Setting

*Landform:*

- Worock—Mountains
- Loberg—Mountains

*Slope:*

- Worock—15 to 35 percent
- Loberg—15 to 35 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 50 percent

Loberg and similar soils: 35 percent

#### Minor Components

Soils that are gravelly loam throughout: 0 to 8 percent

Soils that have slopes more than 35 percent: 0 to 7 percent

### Major Component Description

#### Worock

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

#### Loberg

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland

*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 196F—Worock-Loberg complex, 35 to 60 percent slopes

### Setting

*Landform:*

- Worock—Mountains
- Loberg—Mountains

*Slope:*

- Worock—35 to 60 percent
- Loberg—35 to 60 percent

*Elevation:* 4,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 50 percent

Loberg and similar soils: 35 percent

#### Minor Components

Soils that are gravelly loam throughout: 0 to 8 percent

Soils that have slopes more than 60 percent: 0 to 7 percent

### Major Component Description

#### Worock

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

#### Loberg

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 396D—Worock gravelly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Worock and similar soils: 85 percent

##### Minor Components

Areas of rock outcrop: 0 to 3 percent  
Soils that are moderately deep: 0 to 3 percent  
Poorly drained soils: 0 to 3 percent  
Loberg soils: 0 to 3 percent  
Soils that have slopes more than 15 percent: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 396E—Worock gravelly loam, 15 to 35 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

#### Composition

##### Major Components

Worock and similar soils: 85 percent

##### Minor Components

Areas of rock outcrop: 0 to 3 percent  
Soils that are moderately deep: 0 to 3 percent  
Poorly drained soils: 0 to 3 percent  
Loberg soils: 0 to 3 percent  
Soils that have slopes more than 35 percent: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 396F—Worock gravelly loam, 35 to 60 percent slopes

#### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent

*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 85 percent

#### Minor Components

Areas of rock outcrop: 0 to 3 percent  
 Soils that are moderately deep: 0 to 3 percent  
 Loberg soils: 0 to 3 percent  
 Poorly drained soils: 0 to 2 percent  
 Soils that have an extremely gravelly subsoil: 0 to 2 percent  
 Soils that have slopes more than 60 percent: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 596D—Worock, cool-Loberg complex, 8 to 15 percent slopes

### Setting

*Landform:*  
 • Worock—Mountains  
 • Loberg—Mountains  
*Slope:*  
 • Worock—8 to 15 percent  
 • Loberg—8 to 15 percent  
*Elevation:* 4,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 50 percent  
 Loberg and similar soils: 35 percent

#### Minor Components

Soils that have slopes more than 15 percent: 0 to 5 percent  
 Poorly drained soils: 0 to 5 percent  
 Danaher soils: 0 to 5 percent

### Major Component Description

#### Worock

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

#### Loberg

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 596E—Worock, cool-Loberg complex, 15 to 35 percent slopes

### Setting

*Landform:*  
 • Worock—Mountains  
 • Loberg—Mountains  
*Slope:*  
 • Worock—15 to 35 percent  
 • Loberg—15 to 35 percent  
*Elevation:* 4,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 50 percent  
 Loberg and similar soils: 35 percent

**Minor Components**

Soils that have slopes more than 35 percent: 0 to 3 percent  
 Poorly drained soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are moderately deep: 0 to 3 percent  
 Danaher soils: 0 to 3 percent

**Major Component Description****Worock**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

**Loberg**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Material weathered from igneous rocks  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**596F—Worock, cool-Loberg complex, 35 to 60 percent slopes****Setting**

*Landform:*  
 • Worock—Mountains  
 • Loberg—Mountains  
*Slope:*  
 • Worock—35 to 60 percent  
 • Loberg—35 to 60 percent  
*Elevation:* 4,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Worock and similar soils: 50 percent  
 Loberg and similar soils: 35 percent

**Minor Components**

Areas of rock outcrop: 0 to 4 percent  
 Soils that are moderately deep: 0 to 4 percent  
 Evaro soils: 0 to 4 percent  
 Poorly drained soils: 0 to 3 percent

**Major Component Description****Worock**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

**Loberg**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**696E—Worock gravelly loam, dry, 15 to 35 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Worock and similar soils: 85 percent

**Minor Components**

Soils that are shallow: 0 to 4 percent  
 Evaro soils: 0 to 4 percent  
 Danaher soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**696F—Worock gravelly loam, dry, 35 to 60 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Worock and similar soils: 85 percent

**Minor Components**

Soils that are shallow: 0 to 4 percent  
 Evaro soils: 0 to 4 percent  
 Danaher soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**996E—Worock-Rock outcrop complex, 15 to 35 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,600 to 7,500 feet  
*Mean annual precipitation:* 20 to 30 inches  
*Frost-free period:* 30 to 70 days

**Composition****Major Components**

Worock and similar soils: 50 percent  
 Rock outcrop: 35 percent

**Minor Components**

Evavo soils: 0 to 4 percent  
 Whitore soils: 0 to 4 percent  
 Soils that have slopes more than 35 percent: 0 to 4 percent  
 Tigeron soils: 0 to 3 percent

**Major Component Description****Worock**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

**Rock outcrop**

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## 996F—Worock-Rock outcrop complex, 35 to 60 percent slopes

### Setting

#### Landform:

- Worock—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 5,600 to 7,500 feet

*Mean annual precipitation:* 20 to 30 inches

*Frost-free period:* 30 to 70 days

### Composition

#### Major Components

Worock and similar soils: 50 percent

Rock outcrop: 35 percent

#### Minor Components

Evavo soils: 0 to 4 percent

Whitore soils: 0 to 4 percent

Soils that have slopes more than 60 percent: 0 to 4 percent

Very gravelly loamy soils: 0 to 3 percent

### Major Component Description

#### Worock

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

#### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Yreka Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains, hills, and moraines

*Parent material:* Colluvium from mixed rock sources and alpine till

*Slope range:* 2 to 80 percent

*Elevation range:* 4,000 to 6,500 feet

*Annual precipitation:* 18 to 26 inches

*Annual air temperature:* 38 to 42 degrees F

*Frost-free period:* 70 to 90 days

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

### Typical Pedon

Yreka gravelly loam, cool, 35 to 60 percent slopes, in an area of woodland, 300 feet south and 550 feet east of the northwest corner of sec. 30, T. 11 N., R. 10 W.

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

E—0 to 12 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; strong medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine pores; 5 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

E/Bt—12 to 18 inches; 60 percent is light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist (E part); 40 percent is brown (10YR 5/3) gravelly loam, dark brown (10YR 4/3) moist (B part); moderate medium granular structure; slightly hard, friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; 10 percent cobbles and 25 percent pebbles; neutral; clear smooth boundary.

Bt—18 to 60 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; common very fine and fine pores; few faint clay films on faces of peds; 10 percent cobbles and 35 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 40 to 44 degrees F

*Moisture control section:* Between depths of 4 and 12 inches

*Depth to the argillic horizon:* 9 to 24 inches

#### E horizon

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—5 to 15 percent stones and cobbles; 15 to 35 percent pebbles  
 Reaction: pH 5.6 to 7.3

**E/Bt horizon**

Hue: E part—10YR or 7.5YR; B part—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 to 4; B part—2 to 4  
 Texture: Loam or sandy loam  
 Clay content, mixed: 7 to 25 percent  
 Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles  
 Reaction: pH 5.6 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 loam or sandy clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 35 to 60 percent—5 to 25 percent stones and cobbles; 30 to 35 percent pebbles  
 Reaction: pH 5.6 to 7.3

**95D—Yreka gravelly loam,  
8 to 15 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Yreka and similar soils: 85 percent

**Minor Components**

Winkler soils: 0 to 4 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 3 percent  
 Crow soils: 0 to 3 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**95E—Yreka gravelly loam,  
15 to 35 percent slopes****Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

**Composition****Major Components**

Yreka and similar soils: 85 percent

**Minor Components**

Winkler soils: 0 to 4 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 3 percent  
 Crow soils: 0 to 3 percent  
 Areas of rubble land: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **95F—Yreka gravelly loam, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Yreka and similar soils: 85 percent

##### **Minor Components**

Winkler soils: 0 to 4 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Soils that are shallow: 0 to 3 percent  
 Crow soils: 0 to 3 percent  
 Areas of rubble land: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **195E—Yreka gravelly loam, cool, 15 to 35 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Yreka and similar soils: 85 percent

##### **Minor Components**

Crow soils: 0 to 5 percent  
 Bignell soils: 0 to 5 percent  
 Soils that have very gravelly upper layers: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **195F—Yreka gravelly loam, cool, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,000 to 6,500 feet  
*Mean annual precipitation:* 18 to 25 inches  
*Frost-free period:* 70 to 90 days

#### **Composition**

##### **Major Components**

Yreka and similar soils: 85 percent

##### **Minor Components**

Soils that are gravelly loam throughout: 0 to 8 percent  
 Soils that have slopes more than 60 percent: 0 to 7 percent

#### **Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 995E—Yreka-Rock outcrop complex, 15 to 35 percent slopes

#### Setting

##### *Landform:*

- Yreka—Mountains
- Rock outcrop—Mountains

*Slope:* 15 to 35 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Yreka and similar soils: 55 percent

Rock outcrop: 30 percent

##### Minor Components

Soils that are moderately deep: 0 to 4 percent

Whitecow soils: 0 to 4 percent

Soils that have slopes more than 35 percent: 0 to 4 percent

Very gravelly loamy soils: 0 to 3 percent

#### Major Component Description

##### Yreka

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

##### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 995F—Yreka-Rock outcrop complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Yreka—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 60 percent

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 18 to 25 inches

*Frost-free period:* 70 to 90 days

#### Composition

##### Major Components

Yreka and similar soils: 55 percent

Rock outcrop: 30 percent

##### Minor Components

Soils that are moderately deep: 0 to 4 percent

Whitecow soils: 0 to 4 percent

Soils that have slopes more than 60 percent: 0 to 4 percent

Very gravelly loamy soils: 0 to 3 percent

#### Major Component Description

##### Yreka

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Colluvium

*Native plant cover type:* Forestland

*Flooding:* None

*Available water capacity:* Mainly 5.6 inches

##### Rock outcrop

*Definition:* Areas of exposed bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.



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# Glossary

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**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.

**Area reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**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, 1962).

**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.
- Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.
- Excess salt** (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.
- 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 oven-dry 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.
- 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, 1962). 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.

**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.

**Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers 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

**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.

**$K_{sat}$ .** Saturated hydraulic conductivity. (See Permeability.)

**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.)

**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.

**Percs slowly** (in tables). The slow movement of water through the soil, adversely affecting the specified use.

**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.

**Poor filter** (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

**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.

**Rooting depth (in tables).** Shallow root zone. The soil is shallow over a layer that greatly restricts 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

**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 refill (in tables).** The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones (in tables).** Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of 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  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . 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.

**Too arid** (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

**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.

**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.

**Variation.** 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 oven-dry 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.

# Accessibility Statement

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