MT651—Soil Survey of Sanders and Parts of Lincoln and Flathead Counties, Montana

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.
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 1995. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, Bureau of Indian Affairs; and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Eastern Sanders County Conservation District; the Green Mountain Conservation District; the Flathead Conservation District; the Lincoln Conservation District; and the United States Department of the Interior, Bureau of Indian Affairs. Financial assistance was provided by the United States Department of the Interior, Bureau of Indian Affairs.

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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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

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

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

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

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

Dave White
State Conservationist
Natural Resources Conservation Service
Soil Survey of
Sanders and Parts of Lincoln and Flathead Counties, Montana

Fieldwork by Michael J. Hansen, Calvin R. Sibley, Gregory L. Snell, David J. Trochlell, and Thomas J. Weber, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
United States Department of the Interior, Bureau of Indian Affairs, and
Montana Agricultural Experiment Station

The SANDERS AND PARTS OF LINCOLN AND FLATHEAD COUNTIES soil survey is located in northwestern Montana (fig. 1). The survey area has a total of 945,500 acres, or 1,477 square miles. It is characterized by steep mountain ranges, foothill areas, and narrow to broad mountain valleys.

The elevation ranges from 2,175 feet at the Clark Fork River near the Cabinet Gorge Dam to 7,996 feet at Squaw Peak.

Precipitation ranges from 10 inches along the Little Bitterroot River to over 50 inches in the mountains. Typically, winters are long and cool; springs and falls are moist; and summers are hot and dry.

Native vegetation of the drier valleys and foothill areas is bunchgrass prairie species. The moister western valley areas are forested with mixed coniferous and deciduous tree species, especially along major drainages. Vegetation of mountainous areas consists of coniferous forest habitat types, varying from dry ponderosa pine types to moist western red cedar and western hemlock types.

About 65 percent of the survey area is forestland while 30 percent is range and pasture. The remaining 5 percent is cropland.

The major population centers include Dixon, Heron, Hot Springs, Noxon, Paradise, Plains, Thompson Falls, and Trout Creek. Thompson Falls is the Sanders County seat. State Highways 200, 135, 28, and 56 are the major arteries, routed mainly along the Clark Fork and Flathead Rivers.

The major industries include agriculture, mining, timber, and service industries.

Figure 1.—Location of Sanders and Parts of Lincoln and Flathead Counties, Montana

General Nature of the Survey Area

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

History

The earliest known inhabitants within the survey area were bands of Native Americans of the Pend d’Oreille and Salish tribes living along the major rivers. These bands used the rivers and their
associated valleys as transportation and trade routes. The topography of the area enabled the tribes to cross east of the Continental Divide to hunt buffalo on the plains.

European habitation in the area began in 1809 with the establishment of Salish House, a trading post and fort, by David Thompson of the Northwest Fur Company. Salish House was located along the Clark Fork River about 8 miles upstream from present-day Thompson Falls. Later, another Northwest Fur Company employee, Jocko Finley, set up a camp along the Bull River and established trade with tribes along the Flathead River.

By 1847, Angus McDonald, a trader for the Hudson Bay Company, established Fort Connah in Mission Valley to capitalize on the fur trade in the area of the present-day Flathead Indian Reservation. Fort Connah was the last Hudson Bay Company post built in the United States. The fort remained active until 1871, when a declining fur industry and the discovery of gold in the Deer Lodge Valley brought an end to business.

On July 16, 1855, Governor Stevens signed the Hellgate Treaty with leaders of the Salish, Pend d’Oreille, and Kootenai tribes to establish the Flathead Indian Reservation.

The arrival of the Great Northern Railroad in 1883 accelerated settlement and spurred development of mining, creating towns including Heron, Trout Creek, and Vermilion. The development of mining created an increasing demand for timber products. Lumber mills were built to meet the demand. The timber industry later replaced mining as the major economic activity of the region.

Sanders County was established on February 7, 1905 from part of Missoula County. The county was named after U.S. Senator William F. Sanders.

In 1910, the government opened the Flathead Indian Reservation to white homesteaders, who flocked to the area to stake land claims. The late 1920s brought years of drought, high interest rates, and low farm prices, which caused foreclosure of many farms. To offset this trend, the government accelerated construction of irrigation projects that brought higher, consistent agricultural yields and electricity throughout the reservation.

A series of dams, beginning with the one at Thompson Falls, were constructed along the lower Clark Fork River for power generation and flood control.

Industry, Transportation, and Recreation

The agricultural, mining, and timber industries continue to be very important to the economy of the survey area. In addition, small businesses catering to local populations and recreationists are helping to create a more stable, diversified local economy.

Plains and Thompson Falls are the two major retail centers and markets serving Sanders County and the surrounding area. Smaller towns such as Dixon, Heron, Hot Springs, Noxon, Paradise, and Trout Creek have varying degrees of services and markets.

Agriculture, lumber production, and recreation are the main industries. Cedar, fir, pine, and western larch (locally called tamarack) are harvested for dimension lumber, house logs, plywood, and posts and poles.

Agriculture caters to both traditional and specialty markets. Farm-ranch combinations produce livestock—cattle, horses, and sheep—and grains—barley, oats, and wheat—and hay. Nontraditional crops include bluegrass lawn seed, mint, and ornamental flowers that are preserved and sold to florists.

Major roads crossing the survey area include U.S. Highway 2 and State Highway 200, both of which run east to west. Local highways include State Highway 28, running northeast to southwest through the Flathead Indian Reservation; State Highway 56, running north to south along the Bull River; and State Highway 135, running northeast to southwest along the Clark Fork River. The county road and old ACM (Anaconda Copper Mining Company) road parallel the Thompson River from State Highway 200 to U.S. Highway 2. An extensive network of gravel roads and logging roads provide corridors through the area.

Montana Rail Link runs southeast to northwest. Small airports with asphalt runways are located in Plains and Thompson Falls, with numerous grassed runways located throughout the survey area on private property.

Outdoor recreational opportunities are varied and nearly unlimited in this corner of Montana. The Clark Fork, Flathead, and Thompson Rivers are popular for boating, fishing, rafting, water-skiing, and wildlife viewing. The surrounding mountains provide opportunities for camping, cross-country skiing, hiking, hunting, and snowmobiling. Several dude ranches and outfitting-guide services are located within the survey area. In addition, the valleys are
dotted with vacation or retirement homes for people from all over the country.

Physiography, Drainage, and Geology

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

The survey area lies west of the Continental Divide in the northern Rocky Mountain physiographic province, within the structural province of the Rocky Mountain Fold-Thrust Belt.

The survey area contains portions of four mountain ranges, all of which trend northwest to southeast. The ranges include the Cabinet Mountains in the northern portion; the Salish Mountains, mostly contained within the Flathead Indian Reservation in the northeastern corner; the Bitterroot Range along the southwestern border, forming the Montana-Idaho state line; and the Coeur d’Alene Mountains in the southern portion, splitting off from the Bitterroot Range and forming the boundary between Sanders and Mineral Counties.

The survey area is characterized by rugged, mountainous terrain that is drained by the Flathead and Thompson Rivers and the Clark Fork of the Columbia River. Most of the major valleys are flat and wide, but portions of the Clark Fork River and most of the major tributaries are narrow and deeply incised. The Cabinet Mountains were sculpted by glaciers and, in general, are higher and more rugged than the surrounding mountains. Southeast of the Vermilion River, the mountain topography is less rugged, and in the Thompson River drainage, it is even more subdued. The Bitterroot Range is lower and less rugged than the Cabinet Mountains and shows less evidence of glaciation. The Salish Mountains to the east consist of a series of low, rolling hills.

Approximately one-half of Sanders County is included in the survey area, including most of the county’s eastern half and the lower-elevation valley of the Clark Fork River corridor that extends up the river from Heron, near the Idaho border, to Dixon, near the county’s eastern border. The survey area also includes 57,000 acres in southeastern Lincoln County and 45,400 acres in southwestern Flathead County. The portion of the Flathead Indian Reservation located in Sanders County was also included in this survey area. Most of the mountainous areas in the western portion of Sanders County were not included in this survey, including all U.S. Forest Service lands and the Cabinet Mountain Wilderness.

Elevations range from approximately 2,175 feet (663 meters) above sea level, just downstream of the town of Heron, to 7,996 feet (2,437 meters) at Squaw Peak in the Coeur d’Alene Mountains. The highest peaks in the survey area are located in the Cabinet Mountain Wilderness, with elevations between 7,500 and 8,700 feet (2,290 and 2,650 meters).

Numerous waterways in the western and central portions of the survey area drain the Bitterroot Range and the Coeur d’Alene Mountains into the Clark Fork River. The Flathead River drains the eastern portion of the survey area then flows into the Clark Fork River just above the town of Paradise.

Three reservoirs that impact this survey area have been constructed on the Clark Fork River. In Idaho near the Montana border, the Cabinet Gorge Reservoir impounds water as far upstream as the town of Noxon. Just upstream from Noxon, the Noxon Rapids Dam impounds water up to the Thompson Falls Golf Course. The Thompson Falls Dam impounds water from the town of Thompson Falls almost to Weeksville.

The geologic history of the survey area began in the Precambrian Era, approximately 1.5 billion-years ago (bya), with the deposition of a very thick sequence of sedimentary rocks known as the Belt Supergroup. Vast amounts of sediment were deposited because vegetation had not yet developed on the continents to prevent erosion. Sandstone, shale, siltstone, and minor amounts of limestone were deposited into a long, narrow basin that contained exposed mudflats; small beaches; and shallow, probably brackish, water. Sandstone was deposited on beach and near-shore environments; shale and siltstone were deposited in lower energy, deep-water environments; and limestone was normally formed in warm, shallow water.

As sediments accumulated, the basin subsided. Some estimates place the total thickness of Belt rocks at a minimum of 60,000 feet (18.3 kilometers) (Harrison, Griggs, and Wells, 1986). Over time, the sediments were metamorphosed by pressure caused by the great weight of accumulated sediments and increased temperatures caused by regional volcanic activity. Sandstone was metamorphosed to quartzite, shale to argillite, and siltstone to siltite.

Three episodes of volcanic activity during this time resulted in the intrusion of dikes and sills between sedimentary beds of the Belt rocks. The dikes cut across bedding planes, and the sills intruded between sedimentary beds. Both dikes and sills occur in narrow bands up to a mile wide. The sills extend along bedding planes for miles and are prevalent in
the mountains south and southwest of Camas Prairie. Mineral deposits associated with these igneous bodies include ores of copper, gold, lead, silver, and zinc.

Belt sedimentation ended with an orogeny, or mountain-building episode, that occurred about 800-million years ago (mya). During this orogeny, the Belt basin was gently folded and faulted. Some of the major structural features present today were formed at this time.

During the Cambrian Period (570 to 505 mya), sedimentary rocks were unconformably deposited upon older Belt rocks as the ocean rose and the coastline moved to the east.

Where much of Montana was above sea level, erosion occurred over long periods and created disconformities, or gaps, in the geologic record. In the survey area, the disconformity extends from the late-Cambrian Period to the Cretaceous Period, approximately 120-million years ago.

Many of the prominent structural features that are visible today began forming in the Cretaceous Period. At that time, a collision between major crustal plates to the west created compressional forces that formed the Rocky Mountains. This regional northeastern-southwestern compression resulted in large-scale folds and faults that trend northwest to southeast. Relatively thin sheets of Belt rocks were thrust up over younger sedimentary rocks in a series of imbricate, or overlapping, faults. Numerous, closely spaced thrust faults with minor displacement are associated with the large-scale faults. Some of the thrust planes were subsequently folded, overturned, and faulted again.

All of the Precambrian-aged bedrock in the survey area was moved into the area on these thrust sheets. The displacement has been estimated to be at least 50 miles (80 kilometers) from the west. Major faults include the Lewis and Clark Line, which extends from Coeur d’Alene, Idaho, southeast to Helena, Montana, and the Hope Fault Zone, which extends up the Clark Fork Valley from Noxon through Thompson Falls to Olson Peak, 6 miles (10 kilometers) northeast of Saint Regis. Blue Slide, visible from Finley Flats a few miles downstream of Thompson Falls, is located along the Hope Fault Zone. At Olson Peak, the Hope Fault Zone splits into the Ninemile and Saint Mary's Faults. The Ninemile Fault extends to the southeast through the Clark Fork Valley for approximately 10 miles (16 kilometers) then across the mountains to Frenchtown. The Saint Mary's Fault extends eastward from the Olson Peak area up the Flathead River to Ravalli where it splits into several smaller faults.

The survey area includes several other major thrust faults that extend to the northwest from the Lewis and Clark Line. This line of faults is considered to reflect some deep crustal flaw formed in the Precambrian Era that has been reactivated intermittently throughout geologic time.

During the Cretaceous orogeny, deep-seated melting created masses of magma that rose into the upper crust. As it rose, it deformed the surrounding sedimentary formations; lubricated planes of thrust faulting; and, in many areas, mineralized the surrounding rock. Some of the magma rose to the surface, forming extrusive as well as intrusive igneous rocks in western Montana. Many of the plutons are located along or near high-angle faults, and most appear to intrude through, or at least into, thrust plates.

A zone of intrusions extends north-northeast along the Lewis and Clark Line from Wallace, Idaho, to the northeastern side of the Clark Fork Valley near Trout Creek, Montana. Radiometric dating has been performed on some of these intrusions, and their ages range from about 120- to 35-million years (Marvin and others, 1984). Hydrothermal activity, occurring as these intrusions cooled, formed a variety of mineral deposits and created the rich mining districts of Idaho and western Montana.

Two major Cretaceous-aged intrusions occur in the survey area. One is located across the Clark Fork River from Trout Creek at the mouth of the Vermilion River. The other is located in the area between Beaver and Little Beaver Creeks, southwest of the town of White Pine.

Mountain building continued into the Tertiary Period (66 to 1.6 mya) when volcanism and erosion of the newly formed Rocky Mountains created extensive basin-fill deposits. As the surrounding mountains were uplifted, great volumes of sediment were washed into the valleys. Volcanic eruptions to the west blanketed the survey area with volcanic ash that also was washed into the valleys.

Tertiary-aged volcanic rocks deposited during the Oligocene Epoch (37 to 24 mya) are exposed in the Hog Heaven Volcanic Field. It is located at the northern end of the Little Bitterroot Valley and occupies an area of approximately 20 square miles (50 square kilometers). The Hog Heaven Mining District is associated with this volcanic field.

The Quaternary Period (1.6 mya to present) has been dominated by periods of glaciation, volcanism, and continuing erosion and deposition. The landscape of the survey area has been extensively altered by glaciation. Alpine glaciers have covered
the high peaks of the Bitterroot Range and the Cabinet and Coeur d’Alene Mountains. These glaciers eroded jagged ridges and U-shaped valleys and deposited linear moraines and glacial outwash in many valleys. Ice advances from large continental ice sheets to the north have significantly affected the topography in the lower elevations.

Many of the soils in the survey area have distinctive pale layers of volcanic ash originating from volcanic eruptions in the Cascade Range. Glacier Peak in the northern Washington Cascade Range erupted approximately 12,000 years ago. Ash from this eruption spread to the east and southeast in an elliptical pattern, covering western Montana from Flathead Lake south to the Salmon River Mountains in Idaho. Mount Mazama, now Crater Lake, in the southern Oregon Cascade Range erupted less than 7,000 years ago. Ash from this eruption spread over the area between northern Nevada and southwestern Alberta; this area includes western Montana.

Today, streams and rivers are actively reworking the alluvial deposits in the existing flood plains. These flood plains are subject to overflow from fluctuating water levels caused by spring runoff. Alluvial terraces at higher elevations along the valley floors show former river levels. These older terraces are no longer undergoing active deposition and are relatively stable. The northeastern portion of the Plains Valley contains a large stream terrace that is composed of glacial lakebed sediments.

Vast continental glaciers have advanced and retreated from northern Canada many times during the Pleistocene Epoch (1.6-million to 10,000 years ago). Four separate ice advances have been identified. During the last ice advance, approximately 15,000 years ago, the glaciers were at their maximum extent. During this time, the final advance of the Cordilleran Ice Sheet, which covered most of the Canadian Rocky Mountains, significantly affected the topographic features in the survey area. One lobe overrode the Salish Mountains to the northeast and advanced down the Bull River and Thompson River drainages to the west. Another huge lobe advanced from the Purcell Valley in British Columbia south through what is now Sand Point, Idaho, and up the Clark Fork Valley in Montana.

This huge lobe created a large ice dam at the present site of Lake Pend Oreille, located in Idaho, less than 20 miles (32 kilometers) from the Idaho-Montana border. This ice dam was 2,000-feet (610-meters) high, and the area behind it filled in by rising waters in the Clark Fork and Flathead Valleys. This body of water has been named Glacial Lake Missoula, and it stretched from the ice dam east to the Drummond area and south as far as Darby. Everything in these drainages below an elevation of 4,300 feet (1,310 meters) above sea level was flooded. Lakebed deposits occur both in valley bottoms and high in the foothills. It is estimated that this ice dam breached and then refilled between 36 and 41 times. These old shorelines can be seen in a series of distinctive horizontal benches in the hills above Missoula.

As the water in Glacial Lake Missoula rose, the ice dam floated and eventually failed. As the lake drained, water, with an estimated output of 8 to 10 cubic miles of water per hour, poured out of the breach and down the Clark Fork Valley. The rapid drainage of this huge body of water scoured soil from valley walls, particularly in the narrower reaches of the Clark Fork Valley, and left distinctive and unusual deposits in the survey area. Rainbow Lake (also known as Dog Lake) was scoured out of bedrock as water flowed over the divide from the Little Bitterroot Valley toward Plains.

The unique flood deposits include the giant ripple marks in the Camas Prairie and Rainbow Lake areas. The ripple marks are composed of sand and gravel and are as large as 35-feet (11-meters) high, spaced 200 to 500 feet (60 to 150 meters) apart. Another unusual deposit was created by eddying water at the mouths of tributaries to the Clark Fork River. As the surging water in the tributaries tried to enter the main flow down the Clark Fork River, eddies were formed that dropped massive sand and gravel deposits in the mouths of the tributaries. These “valley plugs” look like small earthen dams and can be seen between Perma and Paradise and east of Thompson Falls. Today, sand and gravel are mined from these deposits.

After Glacial Lake Missoula drained, winds generated from the remaining ice blew sediment into dunes and small drift deposits. These deposits are particularly noticeable near Sloan Bridge along the Flathead River. In these aeolian deposits, the Dryfork, Kerrdam, and Selow soils are associated with silty deposits and the Sacheen soils are associated with sandy deposits.

The sequence of rocks exposed in the survey area is summarized below, listed in order of decreasing age. Formations are defined as a succession of strata distinctive enough to constitute a basic unit for mapping, identified by similar rock type and stratigraphic position. Formations can be combined
into groups or subdivided into members. Systems are the rocks deposited during a particular geologic period. In many cases, outcrop areas for individual formations are small and difficult to differentiate in the field. In these cases, no soil series are correlated with the formation. In some cases, individual formations have not been correlated across broad areas so the formation names have not been formally recognized. These formations are not listed here.

Precambrian System (2.5 bya to 570 mya). The oldest rocks in the survey area belong to the Belt Supergroup. These rocks are commonly thinly bedded, and, because they were only lightly metamorphosed, many of their original sedimentary features, such as ripple marks and mud cracks, are well preserved.

The oldest unit within the Belt Supergroup is the Prichard Formation, which consists of thinly bedded black and gray argillite, gray siltite, with gray impure quartzite at the base of the formation. This formation is the most extensive within the Belt Supergroup, with an overall thickness of more than 20,000 feet (6 kilometers). It separates into thin slabs along bedding planes and is quarried between Paradise and Saint Regis for decorative stone.

The next youngest unit is the Ravalli Group, consisting of the Burke, Revett, and Saint Regis Formations. The Burke Formation consists of gray to purple siltite interbedded with lesser amounts of green to purple argillite. Tiny, perfectly formed octahedral crystals of magnetite are common in the siltites. Thicknesses range from 2,500 to 7,500 feet (760 to 2,290 meters).

The Revett Formation contains beds of white, tan, and purple streaked, blocky, crossbedded quartzite. Thicknesses vary from 2,000 feet (610 meters) in the western portion of the survey area to 500 feet (150 meters) near Flathead Lake.

The upper unit of the Ravalli Group is the Saint Regis Formation, which consists of an interbedded carbonate-bearing sequence of purple and dark-green argillite and siltite. Thicknesses range from 1,000 to 3,000 feet (305 to 915 meters).

In Flathead County and northeastern Sanders County, the Saint Regis Formation is designated as the Spokane Formation. The formations were deposited at the same time, in the same stratigraphic position at the top of the Ravalli Group, with similar rock types, but they were associated with different depositional environments, or facies. The Spokane Formation also consists of interbedded purple and dark-green argillite and siltite; however, it includes thin interbeds of white quartzite.

The Empire Formation occurs on the Flathead-Sanders county line and in the Flathead Lake area. This formation consists of thin, even beds of light- and dark-green argillite and siltite. It is consistent in its appearance where exposed; however, it does not occur in the western portion of the survey area.

A fairly thick and continuous calcareous sequence, known as the Middle Belt Carbonate, was deposited across the Belt basin approximately in the middle of the sequence of formations. Deposition across this broad area resulted in several different facies; therefore, there are several different formation names for this unit. In this area, the Wallace and Helena Formations represent the Middle Belt Carbonate.

The Wallace Formation varies in thickness and rock type more than any other formation in the survey area. Generally, it consists of finely laminated black and white argillite, green siltite, and minor beds of limestone and dolomite. Near Flathead Lake, this interval is represented by the Helena Formation, which consists of the same rock types as the Wallace Formation but with thicker and more abundant carbonate beds.

The Missoula Group is the youngest of the Belt Supergroup. This group contains rapid changes in rock type, both horizontally and vertically, and has been given different formation names in different areas. Because the nomenclature has not been finalized, it will not be broken into individual formations here. In the Coeur d’Alene Mountains, the rocks consist of thin-bedded reddish-purple and green argillite and quartzite.

Soils weathered from sedimentary rock on moderately steep, forested mountain slopes can generally be divided into three types: noncalcareous, calcareous, and ash influenced. Noncalcareous soils include the Sharrott, Tevis, and Winkler series. Calcareous soils include the Beeskove, Eaglewing, Felan, and Repp series. The Holloway, Mitten, and Phillicher series contain a surface layer of volcanic ash-influenced loess.

The sills and dikes intruded into the Belt sediments are high in iron and magnesium and relatively low in silica. Their rock type ranges from diorite to gabbro, and their physical appearance varies. Soils formed in these intrusive igneous rocks are the Petty and Selway series; they occur mainly on moderately steep mountain slopes and ridges. Petty soils contain a volcanic ash-influenced surface layer.

Paleozoic “Ancient Life” System (570 to 245 mya). The only other sedimentary rocks that occur in the survey area were deposited during the mid- to upper-Cambrian Period, approximately 550- to 505-million years ago. They occur in a north-northwest trending
band just west of Fishtrap Creek and consist of a basal sandstone overlain by an alternating sequence of shale and limestone. The basal unit, the Flathead Formation, is mapped across most of Montana; however, the upper carbonate unit is not differentiated into separate formations here.

The Flathead Formation consists primarily of quartzite. It is overlain by a thin section of shale that contains trilobite fossils. The shale is overlain by gray to tan limestone and dolomite beds with an exposed thickness of approximately 2,500 feet (760 meters).

Mesozoic “Middle Life” System (245 to 66 mya).

Two large Cretaceous-aged (144 to 66 mya) intrusions occur in Sanders County, although they are not in the survey area. In addition, several smaller granitic intrusions are associated with small mining districts.

The Twenty-Odd Stock, associated with the emplacement of the large Idaho Batholith to the west, is located across the Clark Fork River from Trout Creek at the mouth of the Vermilion River and has a granitic composition. This stock is commonly porphyritic with large crystals set in a fine-grained groundmass. The Vermilion River (Silver Butte) Mining District includes both placer and lode mines and is associated with this intrusion.

A large intrusion, associated with the White Pine (Beaver Creek) Mining District, is located in the drainage between Beaver and Little Beaver Creeks. This intrusion is approximately 105-million years old and is composed of rocks that are low in iron and silica, such as syenite.

Cenozoic “Recent Life” System (66 mya to present).

Tertiary-aged volcanic rocks are exposed in the Hog Heaven Volcanic Field. Rock types associated with this extrusive deposit consist of silica-rich flows and domes, ash-flow tuffs, and a volcaniclastic unit that consists of water-worked volcanic materials, mudflows, and breccias. The tuff in the Sullivan Hill area has weathered into spires that are visible from the highway. The silver-lead deposit in the Hog Heaven Mining District is associated with this volcanic field. Soils derived from the Tertiary volcanics include the Battlebutte and Bigdraw series.

Minor amounts of Tertiary-aged (66 to 1.6 mya) basin-fill deposits are exposed in the survey area. They are associated with the Hog Heaven Volcanic Field and consist of semiconsolidated to consolidated conglomerate with interbedded shale, coal, and ash. These deposits are exposed to the southwest of the volcanic field along the north and west sides of the Little Bitterroot Valley near Niarada, and they underlie the Lonepine Aquifer throughout much of the valley.

Fine-textured soils formed in Tertiary deposits on foothills include the Bowlake and Minesinger series. Calcareous, coarse-textured soils on foothills include the Hogsby and Niarada series.

A variety of surficial Quaternary (1.6 mya to present) deposits occur within the survey area. They consist primarily of alluvium, terrace deposits, and glacial moraines and outwash. These deposits are generally unconsolidated and relatively thin. Only the major drainages contain significant amounts of Quaternary-aged alluvium.

Soils formed in older alluvial deposits are the Biglake, Camascreek, Gird, Grantsdale, Marklepass, McCollum, Moiese, and Whitearth series. Soils formed in recent alluvium include the Bigbeaver, Bohnly, Bolack, Gardencreek, Horseplains, Lamoose, and Revais series.

A variety of glacial deposits occur within the survey area. Moraines are hummocky, unsorted deposits that cover the valley bottoms and extend up adjacent slopes. A good example of a moraine occurs near the Big Draw. Soils formed on moraines include the Waldbillig, Wildgen, and Winfall series. Soils formed in glacial lakebed deposits include the Belton, Fernline, Half Moon, Irvine, Lionwood, Lonepine, Redlock, Round Butte, Scotmont, and Selow series. The Doglake and Remount soils formed on gravely ripple marks from glacial outwash. The Beaverdump, Bonnash, and Dbewberry series represent well-defined outwash terraces from Glacial Lake Missoula.

Mineral and Ground-Water Resources

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

The survey area lies in a heavily mineralized region, containing 13 named mining districts and hundreds of prospects and mines that have been worked in the past. In general, mineralization occurs near igneous intrusions and in faulted areas. A wide range of mineralization is present, occupying a variety of host rocks. Most of the mineral production has been copper, lead, silver, and zinc.

The survey area contains seven recognized types of potential ore deposits. They are:

1. Placer gold.
2. Stratabound copper-silver deposits that are confined to a single stratigraphic unit or bedding plane.
3. Stratabound lead-zinc-silver that contains accessory arsenic, sulfur, antimony, and tin.
4. Porphyry molybdenum-tungsten with accessory bismuth that occurs as low-grade deposits in
which sulfide minerals are distributed as stockworks and disseminated grains and are mined in bulk.

5. Platinum-group metals, primarily platinum and palladium with accessory copper and nickel.

6. Epithermal silver with accessory copper, lead, and gold that formed at shallow depths and low temperatures.

7. Mesothermal base- and precious-metal veins that were formed at moderate temperatures and pressures.

Minor amounts of uranium minerals, barite, cobalt, and fluorite occur in the survey area. Antimony was mined and smelted in the Prospect Creek District southwest of Thompson Falls. Currently, there are antimony prospects in this area, but none are being mined. The ore that is smelted and refined is imported primarily from China.

Exploration work has been completed on the Rock Creek Deposit in the Cabinet Mountain Wilderness and the Montanore Deposit located a few miles to the east. These deposits have large silver and copper reserves and are currently in the permitting process.

Placer gold has been mined from the Clark Fork River, near the mouth of Trout Creek; Trout Creek; Vermilion River; and a small area in the Prospect Creek drainage. Placer gold has been found in Tertiary, Pleistocene, and recent alluvium, although the most abundant deposits have been found along present watercourses. The gold occurs in small pockets, both as flakes and large nuggets, and throughout sand and gravel, as erratically distributed particles.

There are no oil or gas fields in the survey area. Until recently, the geology has been considered unfavorable for the occurrence of petroleum resources; however, there has been some interest in what may be trapped beneath the large thrust sheets of Precambrian rock. Seismic exploration has been conducted in the younger carbonates and sandstones that underlie the Belt sediments. Some wildcat drilling was completed in the 1980s. These rocks act as significant petroleum reservoirs in other areas of Montana. However, the great depth of overlying Precambrian sediments and high drilling costs make the chances of large oil or gas production seem unfavorable.

Nonmetallic resources are also mined in the survey area. Gravel is produced from glacial moraines and valley plugs. Argillite and quartzite flagstones are mined for use as decorative rock.

In 1992, active exploration projects recorded by the Montana Bureau of Mines and Geology included the Chau Mine for copper, zinc, and lead in the Cherry Creek drainage; the David King Gold Mine in the Vermilion River drainage; the Glidden Mine for copper, lead, and zinc on Glidden Creek; the Miners Gulch Prospect for copper and silver on the Vermilion River; the Riverside Lead-Zinc Mine on Prospect Creek; the Rock Creek Copper-Silver Deposit mentioned above; the Sheep Creek Lead-Zinc Prospect just upstream of the confluence of the Clark Fork River with the Flathead River; and the Trout Creek Copper-Silver Prospect.

Because of the geologic nature of this region, limited areas are suitable for significant ground-water development. The older, consolidated bedrock formations yield only small amounts of water, most of which is developed from fractures or bedding planes as the bedrock itself is generally of low permeability. Because of the significant amount of regional folding and faulting, most of the bedrock is fractured to some degree. Water quality is good in the bedrock aquifers.

Unconsolidated alluvium and glacial deposits are the most widely used aquifers in the survey area. Yield is highly variable, although most wells have yields between 10 and 20 gallons per minute or gpm (38 and 76 liters per minute or lpm). Yield is dependent on the amount of sand and gravel lenses penetrated and their degree of interconnection. Of the 172 wells listed in the state well database with yields of over 99 gpm (374 lpm), only three are not located in these unconsolidated deposits. Water quality is good to excellent.

The Lonepine Aquifer is a highly productive confined aquifer located in glacial outwash in the Little Bitterroot Valley. The aquifer consists of a bed of clean gravel that is between 20- and 60-feet (6- and 18-meters) thick. It is confined by 200 to 350 feet (60 to 110 meters) of silty clay lakebed sediments, which create artesian pressures in the aquifer. Wells below an elevation of 2,780 feet (847 meters) flow up to 800 gpm (2,300 lpm), but they are subject to declines in pressure and yield because of well interference.

Well use, current to March 1994, for the survey area is summarized below. This information was provided by the Montana Ground-Water Information Center's water well database. Often wells have multiple uses and are listed under both domestic and stockwater supplies, so the total appears to be less than the sum of the uses. Wells reporting yields greater than 99 gpm totaled 172. Of these wells, eight reported yields greater than 999 gpm (3,776 lpm); the highest reported yield was 1,500 gpm (5,670 lpm).

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<tr>
<th>TOTAL WELLS</th>
<th>Domestic</th>
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Domestic ................................................ 1,427
Dissolved silica and the elevated hydrogen sulfide concentrations as well as boron, chloride, and lithium in the water also contains detectable hydrogen sulfide concentrations that are above the U.S. Environmental Protection Agency’s upper limit for potability. The water from the Lonepine Aquifer also contains arsenic, which is undesirable for drinking.

The area as a whole has a modified continental climate, but mountain effects on temperature and precipitation vary widely. The climate is usually mild along the river bottoms throughout the year. The survey area lies within the only major area in the state where the January temperatures average over 24 degrees F. The average July temperature is between 60 and 68 degrees F. The amount of precipitation is generally high compared to the rest of the state because of a warm, moist maritime climatic influence. During the winter, the coldest weather is from Arctic air invasions. These invasions are usually followed by warmer air masses from the west or southwest. Chinook winds often raise temperatures dramatically in a short period.

Along the Bitterroot Range, the mean annual precipitation is over 35 inches, with more than
60 inches on the mountain peaks. Near the Montana-Idaho border, the mountains often receive over 100 inches of precipitation. Along the forested eastern part of the survey area and in the Cabinet Mountains, the average precipitation is 25 to 35 inches with more than 60 inches on the mountain peaks. In the semiarid valleys on the eastern edge of the survey area, the average precipitation is less than 14 inches.

Most precipitation falls from November through February. May and June have the highest growing-season precipitation. The Clark Fork River's high runoff of 2 million acre-feet of water per month occurs during the same May to June period.

In winter, the average temperature is 27 degrees F at Heron and Hot Springs, 28 degrees F at Trout Creek, and 29 degrees F at Thompson Falls. The average daily minimum temperature is 19 degrees F at Hot Springs, 20 degrees F at Heron and Trout Creek, and 22 degrees F at Thompson Falls. The lowest recorded temperature was -40 degrees F at Trout Creek. In summer, the average temperature is 62 degrees F at Heron, 65 degrees F at Hot Springs, 66 degrees F at Thompson Falls, and 63 degrees F at Trout Creek. The average daily maximum temperature is 80 degrees F at Heron, 82 degrees F at Hot Springs, 85 degrees F at Thompson Falls, and 83 degrees F at Trout Creek. The highest recorded temperature was 110 degrees F at Trout Creek.

Growing-degree days, shown in the table "Temperature and Precipitation," 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.

The total mean annual precipitation is 33 inches at Heron, 14 inches at Hot Springs, 23 inches at Thompson Falls, and 29 inches at Trout Creek.

Winds are predominantly from the southwest, with a high seasonal average of 15 miles per hour during winter and 7 miles per hour during summer.

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 1961-1995 at Heron NW, Thompson Falls, and Trout Creek Ranger Station)

<table>
<thead>
<tr>
<th>Temperature (Degrees F)</th>
<th>Precipitation (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Month</strong></td>
<td><strong>Average Daily</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Maximum</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
</tr>
<tr>
<td><strong>HERON NW:</strong></td>
<td><strong>Average</strong></td>
</tr>
<tr>
<td>January---</td>
<td>31.5</td>
</tr>
<tr>
<td>February---</td>
<td>37.9</td>
</tr>
<tr>
<td>March---</td>
<td>45.8</td>
</tr>
<tr>
<td>April---</td>
<td>56.8</td>
</tr>
<tr>
<td>May---</td>
<td>66.7</td>
</tr>
<tr>
<td>June---</td>
<td>73.6</td>
</tr>
<tr>
<td>July---</td>
<td>81.0</td>
</tr>
<tr>
<td>August---</td>
<td>80.2</td>
</tr>
<tr>
<td>September---</td>
<td>69.3</td>
</tr>
<tr>
<td>October---</td>
<td>55.2</td>
</tr>
<tr>
<td>November---</td>
<td>39.7</td>
</tr>
<tr>
<td>December---</td>
<td>32.1</td>
</tr>
<tr>
<td><strong>Yearly:</strong></td>
<td><strong>Average</strong></td>
</tr>
<tr>
<td></td>
<td>55.8</td>
</tr>
<tr>
<td></td>
<td>106.0</td>
</tr>
<tr>
<td><strong>Total——</strong></td>
<td>——</td>
</tr>
</tbody>
</table>

| **THOMPSON FALLS:**     | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** |
| January---              | 34.5      | 20.5      | 27.5      | 52       | -10      | 2          | 2.73      | 1.33      | 3.94      | 7      | 13.0     |
| February---             | 42.8      | 24.1      | 33.4      | 60       | -5       | 9          | 1.98      | 0.91      | 2.90      | 5      | 4.8      |
| March---                | 51.9      | 27.6      | 39.8      | 72       | 8        | 71         | 1.86      | 1.19      | 2.46      | 6      | 3.3      |
| April---                | 62.0      | 33.2      | 47.6      | 85       | 21       | 234        | 1.56      | 0.81      | 2.21      | 5      | 0.0      |
| May---                  | 71.2      | 39.7      | 55.4      | 93       | 27       | 477        | 2.05      | 1.21      | 2.81      | 6      | 0.0      |
| June---                 | 78.4      | 46.2      | 62.3      | 97       | 35       | 671        | 2.18      | 1.15      | 3.08      | 5      | 0.0      |
| July---                 | 86.8      | 49.4      | 68.1      | 102      | 38       | 868        | 1.12      | 0.55      | 1.73      | 3      | 0.0      |
| August---               | 86.8      | 48.9      | 67.8      | 103      | 37       | 865        | 1.32      | 0.50      | 2.15      | 3      | 0.0      |
| September---            | 75.7      | 41.6      | 58.6      | 95       | 26       | 558        | 1.30      | 0.60      | 1.98      | 4      | 0.0      |
| October---              | 60.7      | 34.2      | 47.5      | 82       | 19       | 243        | 1.75      | 0.70      | 2.63      | 5      | 0.0      |
| November---             | 43.0      | 28.5      | 35.7      | 61       | 7        | 27         | 2.57      | 1.49      | 3.54      | 7      | 3.9      |
| December---             | 34.7      | 22.5      | 28.6      | 50       | -9       | 2          | 2.72      | 1.53      | 3.77      | 8      | 13.9     |
| **Yearly:**             | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** | **Average** |
|                         | 60.7      | 34.7      | 47.7      | ——       | ——       | ——         | ——        | ——        | ——        | ——        | ——        | ——        | ——        | ——        |
|                         | 107.0     | -30.0     | 97.0      | 104      | -17      | ——         | ——        | ——        | ——        | ——        | ——        | ——        | ——        | ——        |
| **Total——**            | ——        | ——        | ——        | 4,027    | 23.14    | 19.80      | 26.35     | 64        | 39.0      | ——        | ——        | ——        | ——        | ——        |

See footnote at end of table.
Temperature and Precipitation—Continued

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Daily Maximum</th>
<th>Average Daily Minimum</th>
<th>2 Years in 10 Will Have—</th>
<th>Average Number of Growing-degree Days*</th>
<th>2 years in 10 Will Have—</th>
<th>Average Number of Days Less Than</th>
<th>Average Number of Days More Than</th>
<th>Average of Days With 0.10 or More Snowfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trout Creek:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January---</td>
<td>33.7</td>
<td>18.8</td>
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<td>50</td>
<td>-18</td>
<td>1</td>
<td>3.92</td>
<td>1.89</td>
</tr>
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<td>58</td>
<td>-11</td>
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<td>1.40</td>
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<td>26.0</td>
<td>37.8</td>
<td>69</td>
<td>3</td>
<td>44</td>
<td>2.32</td>
<td>1.08</td>
</tr>
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<td>59.8</td>
<td>31.0</td>
<td>45.4</td>
<td>83</td>
<td>17</td>
<td>177</td>
<td>1.84</td>
<td>1.07</td>
</tr>
<tr>
<td>May-------</td>
<td>69.3</td>
<td>36.6</td>
<td>52.9</td>
<td>91</td>
<td>22</td>
<td>399</td>
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</tr>
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<td>76.3</td>
<td>42.7</td>
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<td>July------</td>
<td>84.7</td>
<td>45.1</td>
<td>64.9</td>
<td>100</td>
<td>32</td>
<td>768</td>
<td>1.26</td>
<td>0.58</td>
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<tr>
<td>August-----</td>
<td>85.6</td>
<td>44.7</td>
<td>65.2</td>
<td>102</td>
<td>31</td>
<td>781</td>
<td>1.34</td>
<td>0.56</td>
</tr>
<tr>
<td>September---</td>
<td>74.8</td>
<td>38.6</td>
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<td>23</td>
<td>451</td>
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<td>October---</td>
<td>59.7</td>
<td>32.1</td>
<td>45.9</td>
<td>82</td>
<td>16</td>
<td>199</td>
<td>1.95</td>
<td>0.76</td>
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<tr>
<td>November---</td>
<td>42.2</td>
<td>27.7</td>
<td>35.0</td>
<td>61</td>
<td>4</td>
<td>20</td>
<td>3.79</td>
<td>2.17</td>
</tr>
<tr>
<td>December---</td>
<td>33.8</td>
<td>21.0</td>
<td>27.4</td>
<td>48</td>
<td>-15</td>
<td>1</td>
<td>3.86</td>
<td>2.32</td>
</tr>
<tr>
<td>Yearly:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average---</td>
<td>59.2</td>
<td>32.2</td>
<td>45.7</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Extreme---</td>
<td>110.0</td>
<td>-40.0</td>
<td>—</td>
<td>103</td>
<td>-25</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total-----</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* 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 1961-1995 at Heron NW, Thompson Falls, and Trout Creek Ranger Station)

<table>
<thead>
<tr>
<th>Probability</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 Degrees F or Lower</td>
</tr>
<tr>
<td><strong>HERON NW:</strong></td>
<td></td>
</tr>
<tr>
<td>Last freezing temperature in spring: January-July</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 later than-----</td>
<td>May 10</td>
</tr>
<tr>
<td>2 years in 10 later than------</td>
<td>May 2</td>
</tr>
<tr>
<td>5 years in 10 later than------</td>
<td>April 17</td>
</tr>
<tr>
<td>First freezing temperature in fall: August-December</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 earlier than------</td>
<td>September 17</td>
</tr>
<tr>
<td>2 years in 10 earlier than------</td>
<td>September 26</td>
</tr>
<tr>
<td>5 years in 10 earlier than------</td>
<td>October 12</td>
</tr>
<tr>
<td><strong>THOMPSON FALLS:</strong></td>
<td></td>
</tr>
<tr>
<td>Last freezing temperature in spring: January-July</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 later than-----</td>
<td>April 24</td>
</tr>
<tr>
<td>2 years in 10 later than------</td>
<td>April 18</td>
</tr>
<tr>
<td>5 years in 10 later than------</td>
<td>April 8</td>
</tr>
<tr>
<td>First freezing temperature in fall: August-December</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 earlier than------</td>
<td>October 1</td>
</tr>
<tr>
<td>2 years in 10 earlier than------</td>
<td>October 9</td>
</tr>
<tr>
<td>5 years in 10 earlier than------</td>
<td>October 26</td>
</tr>
<tr>
<td><strong>TROUT CREEK:</strong></td>
<td></td>
</tr>
<tr>
<td>Last freezing temperature in spring: January-July</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 later than-----</td>
<td>May 19</td>
</tr>
<tr>
<td>2 years in 10 later than------</td>
<td>May 11</td>
</tr>
<tr>
<td>5 years in 10 later than------</td>
<td>April 26</td>
</tr>
<tr>
<td>First freezing temperature in fall: August-December</td>
<td></td>
</tr>
<tr>
<td>1 year in 10 earlier than------</td>
<td>September 16</td>
</tr>
<tr>
<td>2 years in 10 earlier than------</td>
<td>September 24</td>
</tr>
<tr>
<td>5 years in 10 earlier than------</td>
<td>October 11</td>
</tr>
</tbody>
</table>
### Growing Season

(Recorded in the period 1961-1995 at Heron NW, Thompson Falls, and Trout Creek Ranger Station)

<table>
<thead>
<tr>
<th>Probability</th>
<th>HERON NW:</th>
<th>Days</th>
<th>Days</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 years in 10--------</td>
<td>141</td>
<td>114</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>8 years in 10--------</td>
<td>153</td>
<td>123</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>5 years in 10--------</td>
<td>177</td>
<td>139</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2 years in 10--------</td>
<td>200</td>
<td>156</td>
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<tr>
<td>1 year in 10---------</td>
<td>212</td>
<td>164</td>
<td>132</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probability</th>
<th>THOMPSON FALLS:</th>
<th>Days</th>
<th>Days</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 years in 10--------</td>
<td>171</td>
<td>132</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>8 years in 10--------</td>
<td>181</td>
<td>141</td>
<td>113</td>
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<tr>
<td>5 years in 10--------</td>
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<td>2 years in 10--------</td>
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<td>145</td>
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<tr>
<td>1 year in 10---------</td>
<td>229</td>
<td>184</td>
<td>153</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Probability</th>
<th>TROUT CREEK:</th>
<th>Days</th>
<th>Days</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 years in 10--------</td>
<td>130</td>
<td>98</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>8 years in 10--------</td>
<td>143</td>
<td>108</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>5 years in 10--------</td>
<td>168</td>
<td>128</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>2 years in 10--------</td>
<td>193</td>
<td>148</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>1 year in 10---------</td>
<td>207</td>
<td>158</td>
<td>121</td>
<td></td>
</tr>
</tbody>
</table>
Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, “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 survey area.

Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. 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 is about 12 inches in the Hot Springs Valley, 16 inches in the Plains Valley, and increases to about 34 inches in the Heron area at the Idaho state line. Throughout the survey area, the mean annual temperature in the valleys ranges from 42 degrees F to 46 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 in the soil, 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 ground squirrel, mice, and rabbit.

Vegetation in this survey area consists mainly of bunch grasses, mid grasses, and shrubs on the rangeland. Douglas-fir and ponderosa pine are the common low-elevation tree species at the dry end of the survey area, with western larch, lodgepole pine, grand fir, Engelmann spruce, western redcedar, western white pine, and western hemlock increasing in that order with increasing precipitation toward the Idaho state line. Subalpine fir is a common high-elevation stand component.

Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its effect on drainage and runoff. The
topography of the survey area closely affects the local climate. The amount of precipitation and the degree of air temperature can have wide variations within short distances.

Topography in this survey area can be distinctively separated into mountains and valleys. The mountains rise 2,000 to 4,000 feet above the valleys and are moderately steep to very steep with numerous side drainages. The valley floor lying below the mountains is nearly level to gently sloping with steep terrace escarpments along the Clark Fork River.

In the mountains, generally, steepness and shape of slope affect depth to bedrock, amount of rock fragments, and number and distinctness of soil horizons. Soils on steep convex slopes generally have a greater amount of rock fragments, are shallower to bedrock, and have fewer and less distinct soil horizons. Examples of this general principal are the Winkler soil on very steep slopes and the Yourame soil on moderate slopes.

In the valleys, the number and distinctness of soil horizons generally decreases as slope increases. Examples of this general principal are the Irvine soil on steep and very steep slopes and the Round Butte soil on nearly level to strongly slopes.

Parent Material

Soils have formed in a number of parent materials in the survey area. Most of the soils in the valleys are formed in mixed alluvium, lake sediments, or glacial till. The mountains and bedrock-controlled hills may have soils formed in one of the following parent materials: argillite, igneous volcanics, limestone, or quartzite.

A single parent material under the influence of varying amounts of precipitation exhibits marked changes in soil development. Examples of this principal are soils, such as the Bemishave, Fernline, and Whitepine series, that formed in lake sediments and are generally silty to clayey. Other examples are soils, such as the Combest, Mitten, and Stevie series, that formed in argillite and quartzite and are generally loamy with a high rock fragment content and a volcanic ash cap. Soils, such as the Tevis and Winkler series, formed in argillite and quartzite but without the ash cap. Soils, such as the Ashworth, Bata, Courvash, Courville, Wildgen, and Winfall series, formed in glacial till and are generally loamy with few coarse fragments.

Many of the soils in the survey area have accumulated lime from the parent materials. The presence, depth, or amount of lime varies with parent materials and precipitation in the specific area.

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.

The young Horseplains soil is an Entisol that formed in alluvium on flood plains. These soils contain little organic matter from which to form an A horizon and have no clay accumulation. Little translocation of carbonates has occurred.

The mature McDonald soil is a Mollisol that formed in alluvium on alluvial fans, hills, and stream terraces. This soil contains enough organic matter to have a dark A horizon and also have a distinct clay accumulation in the subsoil. Nearly all of the carbonates have been leached below a depth of about 24 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 Mollisol, from mollis, meaning soft.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeroll (Hapl, meaning minimal horizonation, plus xeroll, the suborder of the Mollisols that has a xeric moisture regime).

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

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 coarse-silty over sandy or sandy-skeletal, mixed, superactive, frigid Calcic Haploxerolls.

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 Grantsdale series. The soils in the Grantsdale series are coarse-silty over sandy or sandy-skeletal, mixed, superactive, frigid Calcic Haploxerolls.
Soil Series and Detailed Map Units

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, 1993). 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, Bigarm
gravelly loam, alluvial, 2 to 8 percent slopes, is a
phase of the Bigarm 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. Gird-
McCollum complex, 4 to 8 percent slopes, is an
eexample.

This survey includes miscellaneous areas. They
have little or no soil material and support little or no
vegetation. Riverwash 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."

**Ashworth Series**

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Landform:* Moraines and mountains
*Parent material:* Volcanic ash over calcareous loamy
glacial till
*Slope range:* 2 to 50 percent
*Elevation range:* 3,400 to 4,200 feet
*Annual precipitation:* 28 to 36 inches
*Annual air temperature:* 38 to 44 degrees F
*Frost-free period:* 40 to 70 days

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

**Typical Pedon**

Ashworth gravelly silt loam, 8 to 30 percent slopes,
in an area of forestland, 2,900 feet north and
700 feet east of the southwest corner of sec. 6,
T. 26 N., R. 26 W.

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

A—0 to 1 inches; dark brown (10YR 4/3) gravelly silt
loam, pale brown (10YR 6/3) dry; moderate fine
granular structure; soft, very friable, nonsticky,
nonplastic; common fine and medium and few
coarse roots; volcanic ash component; 15 percent
pebbles; moderately acid; abrupt wavy boundary.

Bw—1 to 10 inches; dark yellowish brown (10YR 4/4)
gravelly silt loam, light yellowish brown (10YR
6/4) dry; weak fine subangular blocky structure
parting to moderate fine granular; soft, very
friable, nonsticky, nonplastic; common fine and
medium and few coarse roots; 20 percent
pebbles; moderately acid; abrupt wavy boundary.

2E—10 to 20 inches; dark grayish brown (2.5Y 4/2)
gravelly loam, light brownish gray (2.5Y 6/2) dry;
moderate fine and medium subangular blocky
structure; slightly hard, friable, slightly sticky,
slightly plastic; common medium and few coarse
roots; 25 percent pebbles; moderately acid; clear
wavy boundary.

2Bk1—20 to 36 inches; grayish brown (2.5Y 5/2)
very gravelly loam, light gray (2.5Y 7/2) dry;
weak medium subangular blocky structure;
slightly hard, friable, slightly sticky, slightly
plastic; common medium and few coarse roots;
10 percent cobbles and 30 percent pebbles;
disseminated lime; few distinct lime coatings on
the undersides of fragments; strongly
effervescent; neutral; gradual wavy boundary.

2Bk2—36 to 50 inches; grayish brown (10YR 5/2)
very gravelly loam, light gray (10YR 7/2) dry;
weak medium subangular blocky structure;
slightly hard, friable, slightly sticky, slightly
plastic; common medium and few coarse roots;
15 percent cobbles and 35 percent pebbles;
disseminated lime; many distinct lime coatings on
undersides of fragments; violently effervescent;
mildly alkaline; gradual wavy boundary.

2C—50 to 60 inches; grayish brown (10YR 5/2)
very cobbly sandy loam, light gray (10YR 7/2)
dry; weak medium subangular blocky structure;
slightly hard, friable, slightly sticky, slightly
plastic; common medium and few coarse roots;
20 percent cobbles and 35 percent pebbles;
disseminated lime; many distinct lime coatings on
undersides of fragments; violently effervescent;
mildly alkaline.

**Range in Characteristics**

*Soil temperature:* 38 to 44 degrees F
*Moisture control section:* Between 4 and 12 inches
*Depth to the Bk horizon:* 15 to 22 inches

**A horizon**

Value: 5 or 6 dry; 3 or 4 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 20 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Reaction: pH 5.6 to 6.5

2E horizon
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 20 to 30 percent—0 to 5 percent cobbles; 20 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

2Bk1 horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 50 percent—10 to 15 percent cobbles; 25 to 35 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 8.4

2Bk2 horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 8.4

2C horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 50 to 60 percent—15 to 20 percent cobbles; 35 to 40 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 8.4

48C—Ashworth gravelly silt loam, 2 to 8 percent slopes

Setting
Landform: Moraines
Slope: 2 to 8 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 28 to 36 inches
Frost-free period: 40 to 70 days

Composition
Major Components
Ashworth and similar soils: 90 percent

Minor Components
Mollman gravelly loam: 0 to 4 percent
Slopes greater than 8 percent: 0 to 3 percent
Auggie silt loam: 0 to 2 percent
McLangor mucky peat: 0 to 1 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

48E—Ashworth gravelly silt loam, 8 to 30 percent slopes

Setting
Landform: Moraines
Slope: 8 to 30 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 28 to 36 inches
Frost-free period: 40 to 70 days

Composition
Major Components
Ashworth and similar soils: 90 percent
Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Mollman gravelly loam: 0 to 3 percent
Auggie silt loam: 0 to 2 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

48F—Ashworth gravelly silt loam, 30 to 50 percent slopes

Setting
Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 28 to 36 inches
Frost-free period: 40 to 70 days

Composition
Major Components
Ashworth and similar soils: 90 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent
Felan gravelly silt loam: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

Auggie Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 2 to 30 percent
Elevation range: 3,400 to 4,400 feet
Annual precipitation: 26 to 30 inches
Annual air temperature: 37 to 42 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-silty, mixed, active Eutric Glossicryalfs

Typical Pedon
Ashworth silt loam, 2 to 8 percent slopes, in an area of forestland, 2,000 feet north and 2,600 feet east of the southwest corner of sec. 32, T. 26 N., R. 26 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
E—0 to 10 inches; white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; weak very fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; moderately acid; clear smooth boundary.
Bt/E1—10 to 16 inches; B part (60 percent) is very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; E part (40 percent) is white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine roots; few faint clay films on faces of peds; slightly acid; gradual smooth boundary.
Bt/E2—16 to 30 inches; B part (80 percent) is pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; E part (20 percent) is white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; moderate coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine roots; common distinct clay films on faces of peds and in pores; slightly acid; gradual smooth boundary.
Bt—30 to 48 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate coarse
subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common distinct clay films on faces of peds and in pores; slightly acid; clear smooth boundary.

C1—48 to 52 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; neutral; clear smooth boundary.

C2—52 to 60 inches; white (10YR 8/2) and very pale brown (10YR 7/3) varved silt loams, light brownish gray (10YR 6/2) and brown (10YR 5/3) moist; moderate medium platy lacustrine sediments; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; disseminated lime; slightly effervescent; slightly alkaline.

**Range in Characteristics**

*Soil temperature:* 39 to 44 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to lime:* 48 to 60 inches

**E horizon**

- Hue: 10YR or 7.5YR  
- Value: 7 or 8 dry; 5 or 6 moist  
- Clay content: 10 to 20 percent  
- Reaction: pH 5.6 to 6.0

**Bt/E horizons**

- Hue: 10YR or 7.5YR  
- Value: B part: 6 or 7 dry, 4 or 5 moist; E part: 7 or 8 dry, 5 or 6 moist  
- Chroma: B part: 3 or 4  
- Texture: Silt loam or silty clay loam  
- Clay content: 15 to 35 percent  
- Reaction: pH 6.1 to 6.5

**Bt horizon**

- Hue: 10YR or 7.5YR  
- Value: 6 or 7 dry; 4 or 5 moist  
- Chroma: 3 or 4  
- Clay content: 27 to 35 percent  
- Reaction: pH 6.1 to 6.5

**C1 horizon**

- Hue: 10YR or 7.5YR  
- Value: 6 or 7 dry; 4 or 5 moist  
- Chroma: 2 or 3  
- Texture: Very fine sandy loam or silt loam  
- Clay content: 10 to 20 percent  
- Reaction: pH 6.1 to 7.3

**C2 horizon**

- Hue: 10YR or 7.5YR  
- Value: 6, 7, or 8 dry; 4, 5, or 6 moist  
- Chroma: 2 or 3  
- Clay content: 10 to 20 percent  
- Calcium carbonate equivalent: 0 to 5 percent  
- Reaction: pH 6.6 to 7.8

**12C—Auggie silt loam, 2 to 8 percent slopes**

**Setting**

*Landform:* Lake plains and terraces  
*Slope:* 2 to 8 percent  
*Elevation:* 3,400 to 4,400 feet  
*Mean annual precipitation:* 26 to 30 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Auggie and similar soils: 90 percent

**Minor Components**

Half moon silt loam: 0 to 5 percent  
Ashworth gravelly silt loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Lacustrine deposits  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 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.

**12E—Auggie silt loam, 8 to 30 percent slopes**

**Setting**

*Landform:* Lake plains and terraces  
*Position on landform:* Dissected or incised treads  
*Slope:* 8 to 30 percent  
*Elevation:* 3,400 to 4,400 feet  
*Mean annual precipitation:* 26 to 30 inches  
*Frost-free period:* 50 to 70 days
Composition

Major Components
Auggie and similar soils: 90 percent

Minor Components
Upsata gravelly silt loam: 0 to 5 percent
Crystalex loamy coarse sand: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 11.0 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.

Backroad Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Volcanic ash over glacial outwash
Slope range: 0 to 15 percent
Elevation range: 3,400 to 3,900 feet
Annual precipitation: 24 to 28 inches
Annual air temperature: 42 to 46 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Dystrudepts

Typical Pedon

Backroad gravelly silt loam, 4 to 15 percent slopes, in an area of forestland, 1,800 feet south and 2,100 feet west of the northeast corner of sec. 14, T. 21 N., R. 26 W.

Oi—1 to 0 inches; undecomposed and slightly decomposed forest litter.
A—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak, fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles; slightly acid; clear wavy boundary.
Bw—3 to 12 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; 25 percent pebbles; slightly acid; clear wavy boundary.

2E—12 to 21 inches; brown (10YR 5/3) very gravelly silt loam, very pale brown (10YR 7/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 40 percent pebbles; slightly acid; clear wavy boundary.

2E/Bw1—21 to 32 inches; E part (80 percent) is pale brown (10YR 6/3) extremely gravelly silt loam, very pale brown (10YR 8/3) dry; B part (20 percent) is yellowish brown (10YR 5/4) extremely gravelly silt loam, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 60 percent pebbles; slightly acid; gradual wavy boundary.

2E/Bw2—32 to 60 inches; E part (60 percent) is pale brown (10YR 6/3) extremely gravelly silt loam, very pale brown (10YR 8/3) dry; B part (40 percent) is yellowish brown (10YR 5/4) extremely gravelly silt loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, nonsticky, nonplastic; few fine, medium, and coarse roots; 15 percent cobbles and 70 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 44 to 48 degrees F
Moisture control section: Between 4 and 12 inches

A horizon
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 30 percent—0 to 5 percent cobbles; 15 to 25 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1.0 to 1.5 percent
Reaction: pH 5.6 to 7.3

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 30 percent—0 to 5 percent cobbles; 15 to 25 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2Fe: 1.0 to 1.5 percent
Reaction: pH 5.6 to 7.3

2E horizon
Value: 6 or 7 dry; 5 or 6 moist
Clay content: 8 to 15 percent
Content of rock fragments: 35 to 55 percent—5 to 15 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bw1 horizon
Value: E part: 6, 7, or 8 dry, 5, 6, or 7 moist;
B part: 5, 6, or 7 dry, 4, 5, or 6 moist
Clay content: 8 to 15 percent
Content of rock fragments: 60 to 80 percent—5 to 20 percent cobbles; 55 to 60 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bw2 horizon
Value: E part: 6, 7, or 8 dry, 5, 6, or 7 moist;
B part: 5, 6, or 7 dry, 4, 5, or 6 moist
Clay content: 5 to 15 percent
Content of rock fragments: 65 to 85 percent—10 to 15 percent cobbles; 55 to 70 percent pebbles
Reaction: pH 5.6 to 7.3

83B—Backroad gravelly silt loam, 0 to 4 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 3,400 to 3,900 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Backroad and similar soils: 85 percent

Minor Components
Slopes greater than 4 percent: 0 to 5 percent
Bignell gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

83D—Backroad gravelly silt loam, 4 to 15 percent slopes

Setting
Landform: Stream terraces
Position on landform: Dissected or incised treads
Slope: 4 to 15 percent
Elevation: 3,400 to 3,900 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Backroad and similar soils: 85 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Bignell gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.
**Barzee Series**

*Depth class:* Very deep  
*Drainage class:* Very poorly drained  
*Permeability:* Moderate  
*Landform:* Moraines and closed depressions  
*Parent material:* Organic deposits  
*Slope range:* 0 to 2 percent  
*Elevation range:* 3,200 to 3,800 feet  
*Annual precipitation:* 24 to 30 inches  
*Annual air temperature:* 40 to 43 degrees F  
*Frost-free period:* 70 to 90 days  

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

**Typical Pedon**

Barzee mucky peat, 0 to 2 percent slopes, on a west-facing moraine, under shrubs and sedges, 2,600 feet north and 1,100 feet west of the southeast corner of sec. 7, T. 26 N., R. 26 W.

Oi—0 to 4 inches; very dark brown (10YR 2/2) broken face and rubbed mucky peat (fibric material); 90 percent fiber and raw herbaceous plant material—70 percent rubbed; massive; nonsticky, nonplastic; 80 percent lycopodium mosses and 20 percent herbaceous species; many very fine and fine roots; moderately acid; clear smooth boundary.

Oe1—4 to 25 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); 60 percent fiber—25 percent rubbed; massive; nonsticky, nonplastic; 90 percent lycopodium mosses and 10 percent herbaceous species; many very fine and fine roots; moderately acid; clear wavy boundary.

Oe2—25 to 55 inches; black (10YR 2/1) and very dark brown (10YR 2/2) broken face and rubbed mucky peat—stratified hemic (80 percent) and fibric (20 percent) material; 40 percent fiber—20 percent rubbed; massive; nonsticky, nonplastic; 80 percent lycopodium mosses and 20 percent herbaceous species; many very fine roots; moderately acid; gradual wavy boundary.

Oe3—55 to 70 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); 40 percent fiber—20 percent rubbed; massive; nonsticky, nonplastic; 90 percent herbaceous species and 10 percent lycopodium mosses; many very fine roots; moderately acid.

**Range in Characteristics**

*Soil temperature:* 42 to 45 degrees F  
*Thickness of organic material:* Greater than 52 inches  
*Depth to the seasonal high water table:* Surface to 12 inches  
*Notes:* The Oi horizon is absent in some pedons, and some pedons have an Oe4 horizon.

**Oi horizon**

Chroma: 1 or 2  
Fiber content, unrubbed: 70 to 90 percent  
Fiber content, rubbed: 65 to 75 percent  
Reaction: pH 5.6 to 6.5

**Oe1, Oe2, and Oe3 horizons**

Value: 2 or 3  
Chroma: 1 or 2  
Fiber content, unrubbed: 40 to 60 percent  
Fiber content, rubbed: 20 to 30 percent  
Reaction: pH 5.6 to 6.5

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**808A—Barzee mucky peat, 0 to 2 percent slopes**

### Setting

*Landform:* Moraines  
*Slope:* 0 to 2 percent  
*Elevation:* 3,200 to 3,800 feet  
*Mean annual precipitation:* 24 to 30 inches  
*Frost-free period:* 70 to 90 days  

### Composition

**Major Components**

Barzee and similar soils: 90 percent  

**Minor Components**

Murrstead mucky peat: 0 to 5 percent  
McLangor mucky peat: 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:* Organic deposits  
*Native plant cover type:* Rangeland  
*Floodability:* Occasional  
*Water table:* Apparent  
*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.
**Bata Series**

**Depth class:** Very deep  
**Drainage class:** Well drained  
**Permeability:** Moderately slow  
**Landform:** Moraines  
**Parent material:** Volcanic ash over glacial till  
**Slope range:** 2 to 30 percent  
**Elevation range:** 3,800 to 4,200 feet  
**Annual precipitation:** 30 to 36 inches  
**Annual air temperature:** 38 to 42 degrees F  
**Frost-free period:** 40 to 70 days  

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

**Typical Pedon**

Bata gravelly silt loam, 2 to 8 percent slopes, in an area of forestland, 1,400 feet north and 2,200 feet east of the southwest corner, sec. 29, T. 25 N., R. 27 W.

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

E—0 to 1 inches; pale brown (10YR 6/3) gravelly silt loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many fine and medium roots; 20 percent pebbles; moderately acid; abrupt wavy boundary.

Bw—1 to 9 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many fine and medium roots; 20 percent pebbles; moderately acid; abrupt wavy boundary.

2E/Bt—9 to 23 inches; E part (70 percent) is pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/2) moist; B part (30 percent) is pink (7.5YR 7/4) gravelly loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; 25 percent pebbles; moderately acid; gradual wavy boundary.

2Bt/E—23 to 40 inches; B part (60 percent) is pink (7.5YR 7/4) gravelly clay loam, brown (7.5YR 5/4) moist; E part (40 percent) is pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/2) moist; texture mixed is gravelly clay loam; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few medium and coarse roots; common distinct clay films on faces of peds; 10 percent cobbles and 25 percent pebbles; moderately acid; gradual wavy boundary.

2Bt—40 to 60 inches; pink (7.5YR 7/4) very gravelly clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few medium and coarse roots; common distinct clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; moderately acid.

**Range in Characteristics**

**Soil temperature:** 39 to 44 degrees F  
**Moisture control section:** Between 4 and 12 inches

**E horizon**

- **Value:** 6 or 7 dry; 5 or 6 moist  
- **Chroma:** 2 or 3  
- **Clay content:** 5 to 15 percent  
- **Content of rock fragments:** 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
- **Moist bulk density:** 0.85 to 1.0 g/cm³  
- **Acid oxalate extractable Al + 1/2 Fe:** 1.0 to 1.5 percent  
- **Reaction:** pH 5.1 to 6.5

**Bw horizon**

- **Hue:** 10YR or 7.5YR  
- **Value:** 5 or 6 dry; 4 or 5 moist  
- **Chroma:** 4 or 6  
- **Texture:** Silt loam or loam  
- **Clay content:** 5 to 15 percent  
- **Content of rock fragments:** 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
- **Moist bulk density:** 0.85 to 1.0 g/cm³  
- **Acid oxalate extractable Al + 1/2 Fe:** 1.0 to 1.5 percent  
- **Reaction:** pH 5.1 to 6.5

**2E/Bt horizon**

- **Hue:** 10YR, 7.5YR, or 5YR  
- **Value:** E part: 6, 7, or 8 dry, 5 or 6 moist; B part: 5, 6, or 7 dry, 4 or 5 moist  
- **Chroma:** E part: 2 or 3; B part: 3 or 4  
- **Clay content:** 12 to 25 percent  
- **Content of rock fragments:** 25 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
- **Moist bulk density:** 0.85 to 1.0 g/cm³  
- **Acid oxalate extractable Al + 1/2 Fe:** 1.0 to 1.5 percent  
- **Reaction:** pH 5.6 to 6.5

**2Bt/E horizon**

- **Hue:** 10YR, 7.5YR, or 5YR  
- **Value:** B part: 5, 6, or 7 dry, 4 or 5 moist; E part: 5, 6, or 7 dry, 4 or 5 moist  
- **Chroma:** E part: 2 or 3; B part: 3 or 4  
- **Texture:** Loam or clay loam  
- **Clay content:** 20 to 35 percent
Content of rock fragments: 25 to 35 percent—0 to 10 percent cobbles; 20 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

2Bt horizon
Hue: 10YR, 7.5YR, or 5YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 3 or 4
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

86C—Bata gravelly silt loam, 2 to 8 percent slopes

Setting
Landform: Moraines
Slope: 2 to 8 percent
Elevation: 3,800 to 4,200 feet
Mean annual precipitation: 30 to 36 inches
Frost-free period: 40 to 70 days

Composition
Major Components
Bata and similar soils: 90 percent

Minor Components
Upsata gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
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.

86E—Bata gravelly silt loam, 8 to 30 percent slopes

Setting
Landform: Moraines
Slope: 8 to 30 percent
Elevation: 3,800 to 4,200 feet
Mean annual precipitation: 30 to 36 inches
Frost-free period: 40 to 70 days

Composition
Major Components
Bata and similar soils: 90 percent

Minor Components
Upsata gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
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.

Battlebutte Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Hills
Parent material: Material derived from semiconsolidated welded tuff
Slope range: 4 to 60 percent
Elevation: 2,600 to 3,700 feet
Annual precipitation: 15 to 22 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days
**Taxonomic Class:** Loamy, mixed, active, frigid, shallow Typic Haploxerolls

**Typical Pedon**

Battlebutte gravelly loam, in an area of Battlebutte-Bigdraw gravelly loams, 15 to 30 percent slopes, in an area of rangeland, 900 feet south and 250 feet west of the northeast corner of sec. 14, T. 24 N., R. 24 W.

**A1**—0 to 2 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium and coarse roots; common very fine tubular pores; 20 percent hard pebbles; neutral; clear smooth boundary.

**A2**—2 to 8 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium and coarse roots; common very fine tubular pores; 20 percent hard pebbles; neutral; clear smooth boundary.

**Bw1**—8 to 13 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; common very fine tubular pores; 20 percent hard pebbles; 10 percent soft fragments; neutral; clear smooth boundary.

**Bw2**—13 to 19 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine and very fine roots; 20 percent hard pebbles and 50 percent soft fragments; neutral; gradual smooth boundary.

**Cr**—19 to 60 inches; semiconsolidated welded tuff.

**Range in Characteristics**

**Soil temperature:** 41 to 45 degrees F

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

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

**Depth to the Cr horizon:** 10 to 20 inches

**Note:** The Bw2 horizon is not present in all pedons.

**A1 horizon**

**Hue:** 10YR or 2.5Y

**Value:** 4, 5, 6, or 7 dry; 3, 4, or 6 moist

**Chroma:** 2, 3, 4, or 6

**Clay content:** 10 to 27 percent

**Content of rock fragments:** 15 to 75 percent—10 to 30 percent hard pebbles; 5 to 45 percent soft fragments

**Reaction:** pH 6.1 to 7.3

**Bw1 horizon**

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

**Value:** 5, 6, or 7 dry; 4, 5, or 6 moist

**Chroma:** 2, 3, 4, or 6

**Clay content:** 10 to 27 percent

**Content of rock fragments:** 50 to 90 percent—10 to 30 percent hard pebbles; 40 to 60 percent soft fragments

**Reaction:** pH 6.1 to 7.3

**Bw2 horizon**

**Hue:** 10YR, 3.5Y, or 2.5Y

**Value:** 5, 6, or 7 dry; 4, 5, or 6 moist

**Chroma:** 2, 3, 4, or 6

**Clay content:** 10 to 27 percent

**Content of rock fragments:** 50 to 90 percent—10 to 30 percent hard pebbles; 40 to 60 percent soft fragments

**Reaction:** pH 6.1 to 7.3

**66F—Battlebutte gravelly loam,**

**30 to 60 percent slopes**

**Setting**

**Landform:** Hills

**Slope:** 30 to 60 percent

**Elevation:** 2,900 to 3,700 feet

**Mean annual precipitation:** 15 to 19 inches

**Frost-free period:** 90 to 110 days

**Composition**

**Major Components**

Battlebutte and similar soils: 90 percent

**Minor Components**

Slopes greater than 60 percent: 0 to 5 percent

Areas of welded tuff outcrop: 0 to 5 percent

**Major Component Description**

**Surface layer texture:** Gravelly loam

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

**Drainage class:** Well drained

**Dominant parent material:** Tuff residuum

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 1.9 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.

166E—Battlebutte-Bigdraw-Welded tuff outcrop complex, 15 to 30 percent slopes

Setting

Landform:
• Battlebutte—Hills
• Bigdraw—Hills
Slope:
• Battlebutte—15 to 30 percent
• Bigdraw—15 to 30 percent
Elevation: 2,900 to 3,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Battlebutte and similar soils: 50 percent
Bigdraw and similar soils: 20 percent
Areas of welded tuff outcrop: 20 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Bigarm gravelly loam: 0 to 5 percent

Major Component Description

Battlebutte
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Bigdraw
Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.2 inches

166F—Battlebutte-Welded tuff outcrop complex, 30 to 60 percent slopes

Setting

Landform: Hills
Slope: 30 to 60 percent
Elevation: 2,900 to 3,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Battlebutte and similar soils: 65 percent
Areas of welded tuff outcrop: 25 percent

Minor Components
Slopes greater than 60 percent: 0 to 5 percent
Bigdraw gravelly loam: 0 to 5 percent

Major Component Description

Battlebutte
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Welded tuff outcrop
Definition: Areas of semiconsolidated volcanic ash and dust.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.
Management
For management information about this map unit, see appropriate sections in Part II of this publication.

266E—Battlebutte-Bigdraw gravelly loams, 15 to 30 percent slopes

Setting

Landform:
• Battlebutte—Hills
• Bigdraw—Hills
Slope:
• Battlebutte—15 to 30 percent
• Bigdraw—15 to 30 percent
Elevation: 2,900 to 3,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Battlebutte and similar soils: 55 percent
Bigdraw and similar soils: 35 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Areas of welded tuff outcrop: 0 to 5 percent

Major Component Description

Battlebutte
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Bigdraw
Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.2 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.

366E—Battlebutte-Bigdraw gravelly loams, moist, 8 to 30 percent slopes

Setting

Landform:
• Battlebutte—Hills
• Bigdraw—Hills
Position on landform:
• Battlebutte—Backslopes and side slopes
• Bigdraw—Footslopes
Slope:
• Battlebutte—8 to 30 percent
• Bigdraw—8 to 30 percent
Elevation: 3,200 to 3,700 feet
Mean annual precipitation: 19 to 22 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Battlebutte and similar soils: 50 percent
Bigdraw and similar soils: 40 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Areas of welded tuff outcrop: 0 to 5 percent

Major Component Description

Battlebutte
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.6 inches

Bigdraw
Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Forestland
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.

**366F—Battlebutte-Bigdraw gravelly loams, moist, 30 to 60 percent slopes**

**Setting**

- **Landform:**
  - Battlebutte—Hills
  - Bigdraw—Hills
- **Position on landform:**
  - Battlebutte—Backslopes and side slopes
  - Bigdraw—Footslopes
- **Slope:**
  - Battlebutte—30 to 60 percent
  - Bigdraw—30 to 50 percent
- **Elevation:** 3,200 to 3,700 feet
- **Mean annual precipitation:** 19 to 22 inches
- **Frost-free period:** 90 to 110 days

**Composition**

**Major Components**

Battlebutte and similar soils: 60 percent
Bigdraw and similar soils: 30 percent

**Minor Components**

Slopes greater than 60 percent: 0 to 5 percent
Areas of welded tuff outcrop: 0 to 5 percent

**Major Component Description**

**Battlebutte**

- **Surface layer texture:** Gravelly loam
- **Depth class:** Shallow (10 to 20 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Tuff residuum
- **Native plant cover type:** Forestland
- **Flooding:** None
- **Available water capacity:** Mainly 1.6 inches

**Bigdraw**

- **Surface layer texture:** Gravelly loam
- **Depth class:** Moderately deep (20 to 40 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Tuff residuum
- **Native plant cover type:** Forestland
- **Flooding:** None
- **Available water capacity:** Mainly 3.1 inches

**Beaverdump Series**

- **Depth class:** Very deep
- **Drainage class:** Somewhat excessively drained
- **Permeability:** Moderately rapid
- **Landform:** Stream terraces
- **Parent material:** Volcanic ash over mixed alluvium and glacial outwash
- **Slope range:** 0 to 35 percent
- **Elevation range:** 2,200 to 2,800 feet
- **Annual precipitation:** 24 to 28 inches
- **Annual air temperature:** 42 to 45 degrees F
- **Frost-free period:** 90 to 105 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Hapludalfs

**Typical Pedon**

Beaverdump gravelly loam, 4 to 15 percent slopes, in an area of forestland, 1,800 feet south and 800 feet east of the northwest corner of sec. 8, T. 23 N., R. 30 W.

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

A—0 to 3 inches; dark yellowish brown (10YR 4/4) gravelly loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 15 percent pebbles; slightly acid; clear wavy boundary.

Bw—3 to 10 inches; yellowish brown (10YR 5/4) gravelly loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; soft, friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 20 percent pebbles; moderately acid; clear wavy boundary.

2E/Bt—10 to 27 inches; E part (60 percent) is brown (10YR 5/3) very gravelly sandy loam, pale brown (10YR 6/3) dry; B part (40 percent) is dark yellowish brown (10YR 4/4) very gravelly sandy loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; slightly acid.
hard, friable, slightly sticky, slightly plastic;
common fine, medium, and coarse roots;
common distinct clay films on faces of peds;
5 percent cobbles and 40 percent pebbles;
neutral; gradual irregular boundary.

2Bt/E—27 to 50 inches; B part (60 percent) is dark yellowish brown (10YR 4/4) very cobbly sandy loam, yellowish brown (10YR 5/4) dry; E part (40 percent) is brown (10YR 5/3) very cobbly sandy loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; common distinct clay films on faces of peds; 25 percent cobbles and 35 percent pebbles; slightly acid; gradual irregular boundary.

2C—50 to 60 inches; pale brown (10YR 6/3) extremely cobbly loamy coarse sand, very pale brown (10YR 7/3) dry; single grain; loose, nonsticky, nonplastic; few fine and medium roots; 35 percent cobbles and 35 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches

A horizon
Value: 4 or 5 moist; 5 or 6 dry
Clay content: 8 to 15 percent
Moist bulk density: 1.0 to 1.4 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 4 or 5 moist; 5 or 6 dry
Clay content: 8 to 15 percent
Moist bulk density: 1.0 to 1.4 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

2E/Bt horizon
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
Clay content: 10 to 20 percent
Content of rock fragments: 40 to 60 percent—5 to 15 percent cobbles; 35 to 45 percent pebbles
Reaction: pH 5.6 to 7.3

2Bt/E horizon
Value: B part: 5 or 6 dry, 4 or 5 moist; E part: 6 or 7 dry, 5 or 6 moist
Clay content: 10 to 20 percent
Content of rock fragments: 40 to 60 percent—15 to 25 percent cobbles; 25 to 35 percent pebbles
Reaction: pH 5.6 to 7.3

2C horizon
Value: 4, 5, or 6 moist; 5, 6, or 7 dry
Clay content: 5 to 15 percent
Content of rock fragments: 65 to 90 percent—25 to 35 percent cobbles; 35 to 55 percent pebbles
Reaction: pH 5.6 to 6.5

62B—Beaverdump gravelly loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Beaverdump and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 4 percent: 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: Volcanic ash over alluvium or outwash
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.
62D—Beaverdump gravelly loam, 4 to 15 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Beaverdump and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 15 percent: 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: Volcanic ash over alluvium or outwash
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.

862E—Beaverdump gravelly loam, 15 to 35 percent slopes

Setting
Landform: Stream terraces
Position on landform: Dissected or incised treads
Slope: 15 to 35 percent
Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Beaverdump and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater 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: Somewhat excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

Beeskove Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains and trough walls
Parent material: Colluvium derived from calcareous argillite and quartzite
Slope range: 4 to 80 percent
Elevation: 3,600 to 5,400 feet
Annual precipitation: 24 to 34 inches
Annual air temperature: 40 to 44 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Eutrudepts

Typical Pedon
Beeskove gravelly loam, 35 to 60 percent slopes, in an area of forestland, 300 feet south and 2,700 feet east of the northwest corner of sec. 15, T. 16 N., R. 21 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
E—0 to 8 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 25 percent pebbles; neutral; clear smooth boundary.
E/Bw—8 to 23 inches; E part (80 percent) is light brownish gray (2.5Y 6/2) very gravelly loam, dark grayish brown (2.5Y 4/2) moist; B part (20 percent) is light yellowish brown (2.5Y 6/4) very gravelly loam, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 45 percent pebbles; neutral; gradual wavy boundary.

Bw—23 to 40 inches; light yellowish brown (2.5Y 6/4) very gravelly loam, olive brown (2.5Y 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; 5 percent cobbles and 40 percent pebbles; neutral; gradual wavy boundary.

Bk—40 to 60 inches; light brownish gray (2.5Y 6/2) extremely gravelly loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common fine, medium, and coarse roots; 10 percent cobbles and 55 percent pebbles; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature:** 42 to 46 degrees F  
**Moisture control section:** Between 8 and 24 inches  
**Depth to the Bk horizon:** 20 to 40 inches

**E horizon**
- **Value:** 6 or 7 dry; 4 or 5 moist  
- **Chroma:** 2 or 3  
- **Clay content:** 7 to 15 percent  
- **Content of rock fragments:** 15 to 30 percent pebbles  
- **Reaction:** pH 6.6 to 7.3

**E/Bw horizon**
- **Hue:** 2.5Y or 10YR  
- **Value:** 6 or 7 dry; 4 or 5 moist  
- **Chroma:** B part: 2, 3, or 4  
- **Clay content:** 5 to 15 percent  
- **Content of rock fragments:** 35 to 55 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles  
- **Reaction:** pH 6.6 to 7.3

**Bw horizon**
- **Hue:** 2.5Y or 10YR  
- **Value:** 5 or 6 dry; 4 or 5 moist  
- **Chroma:** 2, 3, or 4  
- **Texture:** Loam or sandy loam  
- **Clay content:** 5 to 15 percent  
- **Content of rock fragments:** 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles  
- **Reaction:** pH 6.6 to 7.3

**Bk horizon**
- **Hue:** 2.5Y or 10YR  
- **Value:** 6 or 7 dry; 4, 5, or 6 moist  
- **Chroma:** 2 or 3  
- **Texture:** Loam or sandy loam  
- **Clay content:** 5 to 15 percent  
- **Content of rock fragments:** 60 to 75 percent—5 to 10 percent cobbles; 55 to 65 percent pebbles  
- **Calcium carbonate equivalent:** 10 to 15 percent  
- **Reaction:** pH 7.9 to 8.4

**39F—Beeskove gravelly loam, 35 to 60 percent slopes**

**Setting**
- **Landform:** Mountains  
- **Slope:** 35 to 60 percent  
- **Elevation:** 4,200 to 5,400 feet  
- **Mean annual precipitation:** 28 to 34 inches  
- **Frost-free period:** 70 to 90 days

**Composition**

**Major Components**
- Beeskove and similar soils: 85 percent

**Minor Components**
- Eaglewing gravelly loam: 0 to 5 percent  
- Slopes greater than 60 percent: 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:** Well drained  
- **Dominant parent material:** Calcareous argillite or quartzite colluvium  
- **Native plant cover type:** Forestland  
- **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.
77D—Beeskove gravelly loam, moist, 4 to 15 percent slopes

Setting

Landform: Mountains
Slope: 4 to 15 percent
Elevation: 3,600 to 4,200 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Beeskove and similar soils: 90 percent

Minor Components
Mollman gravelly loam, dry: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Slopes greater 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: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
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.

77E—Beeskove gravelly loam, moist, 15 to 35 percent slopes

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 4,200 to 5,400 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Beeskove and similar soils: 90 percent

Minor Components
Mitten gravelly silt loam: 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: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
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.

77F—Beeskove gravelly loam, moist, 35 to 60 percent slopes

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 4,200 to 5,400 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Beeskove and similar soils: 90 percent

Minor Components
Mitten gravelly silt loam: 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: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
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.

771G—Beeskove-Mollman-Rock outcrop complex, 40 to 80 percent slopes

Setting

Landform:
- Beeskove—Glacial trough wall
- Mollman—Glacial trough wall

Slope:
- Beeskove—40 to 80 percent
- Mollman—40 to 60 percent

Elevation: 3,600 to 4,200 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components

Beeskove and similar soils: 45 percent
Mollman and similar soils: 30 percent
Rock outcrop: 15 percent

Minor Components

Slopes less than 40 percent: 0 to 7 percent
Mollman, bouldery: 0 to 3 percent

Major Component Description

Beeskove

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches

Mollman

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.1 inches

Rock outcrop

Definition: Exposures of argillite and quartzite.

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

Management

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

Belton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Lake plains and terraces and stream terraces
Parent material: Lacustrine deposits
Slope range: 0 to 35 percent
Elevation: 2,500 to 3,500 feet
Annual air temperature: 42 to 45 degrees F
Annual precipitation: 15 to 19 inches
Frost-free period: 105 to 125 days

Taxonomic Class: Fine, illitic, frigid Typic Natrixerolls

Typical Pedon

Belton silt loam, 2 to 8 percent slopes, in an area of pasture, 1,400 feet north and 50 feet east of the southwest corner of sec. 21, T. 20 N., R. 24 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; neutral; clear smooth boundary.

Btn1—8 to 17 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to strong fine and medium angular blocky; hard, firm, moderately sticky, moderately plastic; common fine and few medium roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Btn2—17 to 21 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate fine and medium angular blocky structure; hard, firm, moderately sticky, moderately plastic; common fine roots; few faint clay films on faces of peds;
slightly effervescent; neutral; clear smooth boundary.

Bkn—21 to 29 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common fine roots; common seams and masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C—29 to 60 inches; very pale brown (10YR 7/3) silty clay, brown (10YR 5/3) moist; massive; distinct 1/8- to 1/4-inch thick varves; very hard, very firm, moderately sticky, moderately plastic; few fine roots; slightly effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 44 to 47 degrees F
*Moisture control section:* Between 4 and 12 inches
*Thickness of the mollic epipedon:* 7 to 10 inches
*Depth to the Bk horizon:* 13 to 25 inches

**Ap horizon**
- **Value:** 4 or 5 dry
- **Chroma:** 2 or 3
- **Texture:** Silt loam or fine sandy loam
- **Clay content:** 8 to 27 percent
- **Content of rock fragments:** 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
- **Reaction:** pH 6.1 to 7.3

**Btn horizons**
- **Hue:** 10YR or 2.5Y
- **Value:** 6 or 7 dry; 4 or 5 moist
- **Chroma:** 2 or 3
- **Texture:** Silty clay or silty clay loam
- **Clay content:** 35 to 60 percent
- **Content of rock fragments:** 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
- **Electrical conductivity (mmhos/cm):** 2 to 4
- **Sodium adsorption ratio:** 8 to 13
- **Reaction:** pH 6.6 to 7.8

**Bkn horizon**
- **Hue:** 10YR or 2.5Y
- **Value:** 6 or 7 dry; 5 or 6 moist
- **Chroma:** 2 or 3
- **Texture:** Silty clay or silty clay loam
- **Clay content:** 30 to 55 percent
- **Content of rock fragments:** 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
- **Calcium carbonate equivalent:** 10 to 15 percent
- **Electrical conductivity (mmhos/cm):** 2 to 4
- **Sodium adsorption ratio:** 13 to 20
- **Reaction:** pH 7.4 to 8.4

**C horizon**
- **Hue:** 2.5Y or 10YR
- **Value:** 6 or 7 dry; 5 or 6 moist
- **Chroma:** 2 or 3
- **Texture:** Silty clay or silty clay loam
- **Clay content:** 30 to 55 percent
- **Content of rock fragments:** 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
- **Calcium carbonate equivalent:** 5 to 10 percent
- **Electrical conductivity (mmhos/cm):** 2 to 4
- **Sodium adsorption ratio:** 20 to 30
- **Reaction:** pH 7.9 to 9.0

**14A—Belton silt loam, 0 to 2 percent slopes**

**Setting**
- **Landform:** Lake plains and terraces
- **Slope:** 0 to 2 percent
- **Elevation:** 2,500 to 3,000 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 105 to 125 days

**Composition**

**Major Components**
- Belton and similar soils: 85 percent

**Minor Components**
- Camascreek silt loam: 0 to 5 percent
- Round Butte silty clay loam: 0 to 5 percent
- Slopes greater than 2 percent: 0 to 5 percent

**Major Component Description**

- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Lacustrine deposits
- **Native plant cover type:** Rangeland
- **Flooding:** None
- **Sodium affected:** Sodic within 30 inches
- **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.
14B—Belton silt loam, 2 to 8 percent slopes

Setting
Landform: Lake plains and terraces
Slope: 2 to 8 percent
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Belton and similar soils: 85 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent
Camas creek silt loam: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
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.

14D—Belton silt loam, 8 to 15 percent slopes

Setting
Landform: Lake plains and terraces
Slope: 8 to 15 percent
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Belton and similar soils: 90 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
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.

14E—Belton silt loam, 15 to 35 percent slopes

Setting
Landform: Lake plains and terraces
Slope: 15 to 35 percent
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Belton and similar soils: 85 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Areas of lake sediment outcrop: 0 to 5 percent
Slopes greater than 35 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
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.

**Bemishave Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Very slow  
*Landform:* Lake plains or terraces and escarpments  
*Parent material:* Lacustrine and glaciolacustrine deposits  
*Slope range:* 0 to 35 percent  
*Elevation range:* 2,400 to 2,800 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 42 to 45 degrees F  
*Frost-free period:* 100 to 125 days  

**Taxonomic Class:** Fine, mixed, active, frigid Vitrandic Haploxeralfs

**Typical Pedon**

Bemishave loam, 0 to 4 percent slopes, in an area of cropland, 400 feet north and 2,500 feet east of the southwest corner of sec. 18, T. 20 N., R. 26 W.

*Ap*—0 to 5 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine and few fine, medium, and coarse roots; volcanic ash component; neutral; clear smooth boundary.

*E/Bt*—5 to 13 inches; E part (60 percent) is brown (10YR 5/3) loam, light gray (10YR 7/2) dry; B part (40 percent) is brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and few fine, medium, and coarse roots; volcanic ash component; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

*Bt*—13 to 25 inches; brown (7.5YR 5/4) clay, light brown (7.5YR 6/4) dry; moderate coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and few fine, medium, and coarse roots; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

*C*—25 to 60 inches; reddish brown (5YR 5/3) clay, light reddish brown (5YR 6/3) dry; massive; 1/16- to 1/2-inch thick varves of clay; hard, firm, very sticky, very plastic; neutral.

**Range in Characteristics**

*Soil temperature:* 44 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Note:* In the C horizon, varves range from 1/16- to 1/2-inch thick.

**Ap horizon**

Value: 5, 6, or 7 dry; 3, 4, or 5 moist  
Chroma: 2 or 3  
Clay content: 10 to 25 percent  
Moist bulk density: 1.0 to 1.4 g/cm³  
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.2 percent  
Reaction: pH 6.1 to 7.3

**E/Bt horizon**

Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 6 or 7 dry, 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 15 to 25 percent  
Moist bulk density: 1.0 to 1.4 g/cm³  
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.2 percent  
Reaction: pH 6.1 to 7.3

**Bt horizon**

Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 3 or 4  
Clay content: 40 to 60 percent  
Reaction: pH 6.1 to 7.3

**C horizon**

Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 2 or 3  
Texture: Silty clay, clay, or silty clay loam  
Clay content: 35 to 60 percent  
Reaction: pH 6.6 to 7.3

**28B—Bemishave loam, 0 to 4 percent slopes**

**Setting**

*Landform:* Lake plains or terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 2,400 to 2,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 105 to 125 days
Composition

Major Components
Bemishave and similar soils: 90 percent

Minor Components
Slopes greater than 4 percent: 0 to 5 percent
Bemishave stony loam: 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: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.4 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.

Bendahl Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Moraines and mountains
Parent material: Volcanic ash over calcareous loamy glacial till
Slope range: 15 to 50 percent
Elevation range: 3,600 to 4,500 feet
Annual precipitation: 26 to 34 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

Typical Pedon

Bendahl gravelly silt loam, 15 to 30 percent slopes, in an area of forestland, 2,300 feet north and 2,300 feet west of the southeast corner of sec. 12, T. 25 N., R. 27 W.

Oi—1 to 0 inches; undecomposed and slightly decomposed forest litter.
A—0 to 1 inches; dark brown (10YR 4/3) gravelly silt loam, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; 20 percent pebbles; moderately acid; abrupt wavy boundary.
Bw—1 to 7 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; 20 percent pebbles; slightly acid; clear wavy boundary.
2E—7 to 17 inches; pale brown (10YR 6/3) very gravelly loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and common medium roots; 5 percent cobbles and 35 percent pebbles; neutral; gradual wavy boundary.
2E/Bw—17 to 27 inches; E part (60 percent) is pale brown (10YR 6/3) very gravelly loam, light gray (10YR 7/2) dry; B part (40 percent) is yellowish brown (10YR 5/4) gravelly loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and common medium roots; 5 percent cobbles and 40 percent pebbles; slightly alkaline; gradual wavy boundary.
2Bk1—27 to 38 inches; light brownish gray (10YR 6/2) gravelly loam, white (10YR 8/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 10 percent cobbles and 35 percent pebbles; disseminated lime; common distinct lime coatings on undersides of rock fragments; violently effervescent; moderately alkaline; gradually wavy boundary.
2Bk2—38 to 60 inches; light brownish gray (10YR 6/2) very cobbly loam, white (10YR 8/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; 20 percent cobbles and 35 percent pebbles; disseminated lime; many distinct lime coatings on undersides of rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 22 to 32 inches

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 20 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 20 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Reaction: pH 5.6 to 6.5

2E horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 35 to 45 percent—0 to 5 percent cobbles; 35 to 40 percent pebbles
Reaction: pH 6.1 to 7.3

2E/Bw horizon
Hue: 10YR or 2.5Y
Value: E part: 7 or 8 dry, 5 or 6 moist; B part: 6 or 7 dry, 5 or 6 moist
Chroma: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 40 to 55 percent—5 to 10 percent cobbles; 35 to 45 percent pebbles
Reaction: pH 6.1 to 7.8

2Bk1 horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 40 to 55 percent—10 to 15 percent cobbles; 30 to 40 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

2Bk2 horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 50 to 65 percent—20 to 30 percent cobbles; 30 to 35 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

98E—Bendahl gravelly silt loam, 15 to 30 percent slopes

Setting
Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Bendahl and similar soils: 90 percent

Minor Components
Mollman gravelly loam, dry: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

98F—Bendahl gravelly silt loam, 30 to 50 percent slopes

Setting
Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Bendahl and similar soils: 90 percent

Minor Components
Mollman gravelly loam, dry: 0 to 5 percent
Slopes greater than 50 percent: 0 to 5 percent
Major Component Description

Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained  
Dominant parent material: Volcanic ash over till or drift  
Native plant cover type: Forestland  
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.

Berray Series

Depth class: Very deep  
Drainage class: Well drained  
Permeability: Moderate  
Landform: Lake plains or terraces  
Parent material: Volcanic ash over glaciolacustrine deposits  
Slope range: 4 to 15 percent  
Elevation range: 2,200 to 2,600 feet  
Annual precipitation: 28 to 34 inches  
Annual air temperature: 42 to 45 degrees F  
Frost-free period: 70 to 90 days

Taxonomic Class: Ashy over loamy, amorphic over mixed, active, frigid Alfic Udivitrands

Typical Pedon

Berray silt loam, 4 to 15 percent slopes, in an area of forestland, 600 feet north and 400 feet west of the southeast corner of sec. 9, T. 28 N., R. 33 W.

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

A—0 to 1 inch; dark brown (10YR 5/3) silt loam, (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; volcanic ash component; moderately acid; gradual smooth boundary.

Bw1—1 to 8 inches; dark yellowish brown (10YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; moderately acid; gradual smooth boundary.

Bw2—8 to 16 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few coarse roots; moderately acid; clear wavy boundary.

2E and Bt1—16 to 23 inches; E part (90 percent) is dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; soft, friable, nonsticky, nonplastic; common fine and few coarse roots; B part (10 percent) is dark yellowish brown (10YR 4/4) 1/8- to 3/16-inch thick discontinuous lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and few coarse roots; moderately acid; clear wavy boundary.

2E and Bt2—23 to 39 inches; E part (85 percent) is dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; soft, friable, nonsticky, nonplastic; common fine and few coarse roots; moderately acid; B part (15 percent) is dark yellowish brown (10YR 4/4) 1/8- to 3/16-inch thick silt loam lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and few coarse roots; moderately acid; gradual wavy boundary.

2E and Bt3—39 to 60 inches; E part (75 percent) is dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; soft, friable, nonsticky, nonplastic; few fine and coarse roots; moderately acid; B part (25 percent) is dark yellowish brown (10YR 4/4) 3/8- to 2-inch thick silt loam lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine and few coarse roots; moderately acid.

B part (25 percent) is dark yellowish brown (10YR 4/4) 3/8- to 2-inch thick silt loam lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and coarse roots; moderately acid.

Range in Characteristics

Soil temperature: 42 to 45 degrees F
Depth to the 2E horizon: 14 to 26 inches
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Phosphate retention: 25 to 75 percent
1,500 kPa water retention on air-dried samples: 8 to 12 percent

Note: The combined thickness of the A, Bw1, and Bw2 horizons is 14 to 26 inches.

A horizon
Value: 4 or 5 dry; 2 or 3 moist
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Reaction: pH 5.6 to 6.5

**Bw1 horizon**
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 3 or 4
- Clay content: 2 to 10 percent
- Moist bulk density: 0.85 to 1.0 g/cm³
- Reaction: pH 5.6 to 6.5

**Bw2 horizon**
- Value: 5 or 6 dry; 3 or 4 moist
- Chroma: 3 or 4
- Clay content: 2 to 10 percent
- Moist bulk density: 0.85 to 1.0 g/cm³
- Reaction: pH 5.6 to 6.5

**2E and Bt horizons**
- Hue: B part: 10YR or 7.5YR
- Value: B part: 5 or 6 dry
- Texture: Silt loam or very fine sandy loam
- Clay content: E part: 4 to 10 percent; B part: 8 to 18 percent
- Reaction: pH 5.1 to 6.0

**94D—Berray silt loam, 4 to 15 percent slopes**

**Setting**
- Landform: Lake plains or terraces
- Slope: 4 to 15 percent
- Elevation: 2,200 to 2,600 feet
- Mean annual precipitation: 28 to 34 inches
- Frost-free period: 70 to 90 days

**Composition**

**Major Components**
- Berray and similar soils: 90 percent

**Minor Components**
- Slopes greater than 15 percent: 0 to 5 percent
- Berray, gravelly substratum: 0 to 3 percent
- Tamarack moist: 0 to 2 percent

**Major Component Description**
- Surface layer texture: Silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Volcanic ash over glaciolacustrine
- Native plant cover type: Forestland
- Flooding: None
- Available water capacity: Mainly 11.5 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.

**Bigarm Series**

- **Depth class:** Very deep
- **Drainage class:** Somewhat excessively drained
- **Permeability:** Moderately rapid
- **Landform:** Alluvial fans, stream terraces, and hills
- **Parent material:** Colluvium or alluvium derived from argillite and quartzite
- **Slope range:** 2 to 60 percent
- **Elevation:** 2,500 to 5,200 feet
- **Annual precipitation:** 15 to 19 inches
- **Annual air temperature:** 41 to 45 degrees F
- **Frost-free period:** 90 to 120 days

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

**Typical Pedon**

Bigarm cobbly loam, 30 to 60 percent slopes, in an area of rangeland, 2,150 feet south and 200 feet west of the northeast corner of sec. 32, T. 23 N., R. 24 W.

- **A1—0 to 5 inches:** dark gray (10YR 4/1) cobbly loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; 15 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

- **A2—5 to 17 inches:** dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; 20 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

- **Bw—17 to 38 inches:** pale brown (10YR 6/3) very cobbly sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and few medium roots; 20 percent cobbles and 35 percent pebbles; neutral; gradual smooth boundary.

- **C—38 to 60 inches:** pale brown (10YR 6/3) extremely cobbly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few fine roots; 25 percent cobbles and 45 percent pebbles; neutral.
Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the mollic epipedon: 8 to 20 inches
Note: Rock fragments in the control section are mainly argillite and quartzite. In some pedons, there is weakly calcareous material below a depth of 40 inches.

A horizons
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 7 to 18 percent
Content of rock fragments: 20 to 35 percent—0 to 20 percent cobbles; 10 to 35 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent cobbles; 35 to 50 percent pebbles
Reaction: pH 6.6 to 7.3

C horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or loamy sand
Clay content: 5 to 18 percent
Content of rock fragments: 40 to 80 percent—5 to 25 percent stones and cobbles; 35 to 60 percent pebbles
Reaction: pH 6.6 to 7.3

50B—Bigarm gravelly loam, 2 to 8 percent slopes

Setting

Landform: Hills
Slope: 2 to 8 percent
Elevation: 2,600 to 4,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components
Bigarm and similar soils: 90 percent

Minor Components
Minesinger gravelly loam: 0 to 5 percent
Slopes greater than 8 percent: 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 4.7 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.

50D—Bigarm gravelly loam, 8 to 15 percent slopes

Setting

Landform: Hills
Position on landform: Footslopes and toeslopes
Slope: 8 to 15 percent
Elevation: 2,600 to 4,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components
Bigarm and similar soils: 85 percent

Minor Components
Minesinger gravelly loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent
Bigarm stony loam: 0 to 3 percent
Bigarm cobbly loam: 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: Alluvium or colluvium
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.

50E—Bigarm gravelly loam, 15 to 30 percent slopes

Setting
Landform: Hills
Slope: 15 to 30 percent
Elevation: 2,600 to 4,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition
Major Components
Bigarm and similar soils: 85 percent

Minor Components
Bigarm cobbly loam: 0 to 5 percent
Hogsby cobbly loam: 0 to 4 percent
Slopes greater than 30 percent: 0 to 4 percent
Areas of rock outcrop: 0 to 1 percent
Areas of rubble land: 0 to 1 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: 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.

50F—Bigarm cobbly loam, 30 to 60 percent slopes

Setting
Landform: Hills
Slope: 30 to 60 percent
Elevation: 2,600 to 4,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition
Major Components
Bigarm and similar soils: 85 percent

Minor Components
Slopes greater than 60 percent: 0 to 5 percent
Hogsby cobbly loam: 0 to 3 percent
Areas of rock outcrop: 0 to 3 percent
Finley point gravelly loam: 0 to 2 percent
Areas of rubble land: 0 to 2 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: Colluvium
Native plant cover type: Rangeland
Flooding: None
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.

52D—Bigarm gravelly loam, cool, 4 to 15 percent slopes

Setting
Landform: Hills
Position on landform: Footslopes and toeslopes
Slope: 4 to 15 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition
Major Components
Bigarm and similar soils: 85 percent

Minor Components
Minesinger gravelly loam: 0 to 4 percent
Hogsby cobbly loam: 0 to 4 percent
Slopes greater than 15 percent: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Areas of rubble land: 0 to 1 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 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.

52E—Bigarm gravelly loam, cool, 15 to 30 percent slopes

Setting
Landform: Hills
Slope: 15 to 30 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition
Major Components
Bigarm and similar soils: 85 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Bigarm cobbly loam, cool: 0 to 3 percent
Bigarm stony loam, cool: 0 to 2 percent
Hogsby cobbly loam: 0 to 2 percent
Areas of rubble land: 0 to 2 percent
Areas of rock outcrop: 0 to 1 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: Rangeland
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.

52F—Bigarm cobbly loam, cool, 30 to 60 percent slopes

Setting
Landform: Hills
Slope: 30 to 60 percent
Elevation: 3,000 to 5,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition
Major Components
Bigarm and similar soils: 85 percent

Minor Components
Slopes greater than 60 percent: 0 to 5 percent
Finleypoint gravelly loam: 0 to 5 percent
Areas of rubble land: 0 to 3 percent
Areas of rock outcrop: 0 to 2 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: Colluvium
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.

148C—Bigarm gravelly loam, cool, 2 to 8 percent slopes, very stony

Setting
Landform: Hills
Position on landform: Footslopes and toeslopes
Slope: 2 to 8 percent
Elevation: 2,500 to 2,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition
Major Components
Bigarm and similar soils: 90 percent
Minor Components
Bigarm, cool, very bouldery: 0 to 4 percent
Slopes greater than 8 percent: 0 to 4 percent
Minesinger gravelly loam: 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: Alluvium
Native plant cover type: Rangeland
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.

148E—Bigarm gravelly loam, cool, 8 to 25 percent slopes, very stony

Setting
Landform: Hills
Position on landform: Backslopes, footslopes, and side slopes
Slope: 8 to 25 percent
Elevation: 2,500 to 2,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Bigarm and similar soils: 90 percent

Minor Components
Slopes greater than 25 percent: 0 to 5 percent
Bigarm, cool, very bouldery: 0 to 5 percent

Bigarm
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 5.0 inches

Hogsby
Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium or residuum
Native plant cover type: Rangeland

150E—Bigarm-Hogsby-Rock outcrop complex, 8 to 30 percent slopes

Setting
Landform:
- Bigarm—Hills
- Hogsby—Hills
Slope:
- Bigarm—8 to 30 percent
- Hogsby—8 to 30 percent
Elevation: 2,600 to 4,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components
Bigarm and similar soils: 45 percent
Hogsby and similar soils: 20 percent
Rock outcrop: 20 percent

Minor Components
Slopes greater than 30 percent: 0 to 6 percent
Areas of rubble land: 0 to 6 percent
Bigarm, very stony: 0 to 3 percent

Bigarm
Surface layer texture: Cobbly 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 4.7 inches
Flooding: None
Available water capacity: Mainly 1.8 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

150F—Bigarm-Hogsby-Rock outcrop complex, 30 to 60 percent slopes

Setting
Landform:
• Bigarm—Hills
• Hogsby—Hills
Slope:
• Bigarm—30 to 60 percent
• Hogsby—30 to 60 percent
Elevation: 2,600 to 4,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition
Major Components
Bigarm and similar soils: 40 percent
Hogsby and similar soils: 25 percent
Rock outcrop: 20 percent

Minor Components
Areas of rubble land: 0 to 5 percent
Slopes greater than 60 percent: 0 to 5 percent
Finleypoint gravelly loam: 0 to 5 percent

Major Component Description
Bigarm
Surface layer texture: Cobbly 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 3.8 inches

Hogsby
Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium or residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

152E—Bigarm, cool-Hogsby-Rock outcrop complex, 8 to 30 percent slopes

Setting
Landform:
• Bigarm—Hills
• Hogsby—Hills
Slope:
• Bigarm—8 to 30 percent
• Hogsby—8 to 30 percent
Elevation: 3,200 to 5,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition
Major Components
Bigarm and similar soils: 55 percent
Hogsby and similar soils: 20 percent
Rock outcrop: 15 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Areas of rubble land: 0 to 5 percent

Major Component Description
Bigarm
Surface layer texture: Cobbly 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 5.0 inches

Hogsby  
Surface layer texture: Cobbly loam  
Depth class: Shallow (10 to 20 inches)  
Drainage class: Well drained  
Dominant parent material: Colluvium or residuum  
Native plant cover type: Rangeland  
Flooding: None  
Available water capacity: Mainly 1.8 inches

Rock outcrop  
Definition: Exposures of argillite and quartzite.

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

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

152F—Bigarm, cool-Hogsby-Rock outcrop complex, 30 to 60 percent slopes

Setting

Landform:  
• Bigarm—Hills  
• Hogsby—Hills  
Slope:  
• Bigarm—30 to 60 percent  
• Hogsby—30 to 60 percent  
Elevation: 3,000 to 5,200 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components  
Bigarm and similar soils: 40 percent  
Hogsby and similar soils: 25 percent  
Rock outcrop: 20 percent

Minor Components  
Areas of rubble land: 0 to 5 percent  
Slopes greater than 60 percent: 0 to 5 percent  
Finleypoint gravelly loam: 0 to 5 percent

Major Component Description

Bigarm  
Surface layer texture: Cobbly 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 4.1 inches

Hogsby  
Surface layer texture: Cobbly loam  
Depth class: Shallow (10 to 20 inches)  
Drainage class: Well drained  
Dominant parent material: Colluvium or residuum  
Native plant cover type: Rangeland  
Flooding: None  
Available water capacity: Mainly 1.8 inches

Rock outcrop  
Definition: Exposures of argillite and quartzite.

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

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

250E—Bigarm-Rubble land complex, 15 to 30 percent slopes

Setting

Landform: Hills  
Slope: 15 to 30 percent  
Elevation: 2,600 to 4,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components  
Bigarm and similar soils: 60 percent  
Rubble land: 30 percent

Minor Components  
Slopes greater than 30 percent: 0 to 4 percent  
Hogsby cobbly loam: 0 to 3 percent  
Areas of rock outcrop: 0 to 3 percent
Major Component Description

**Bigarm**
- **Surface layer texture:** Cobbly 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 4.7 inches

**Rubble land**
- **Definition:** Areas covered by boulders or stones that support 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.

250F—Bigarm-Rubble land complex, 30 to 60 percent slopes

Setting

- **Landform:** Hills
- **Slope:** 30 to 60 percent
- **Elevation:** 2,600 to 4,800 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 90 to 110 days

Composition

Major Components
- Bigarm and similar soils: 50 percent
- Rubble land: 35 percent

Minor Components
- Hogsby cobbly loam: 0 to 4 percent
- Slopes greater than 60 percent: 0 to 4 percent
- Finleypoint gravelly loam: 0 to 4 percent
- Areas of rock outcrop: 0 to 3 percent

Major Component Description

**Bigarm**
- **Surface layer texture:** Cobbly 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 4.1 inches

Rubble land
- **Definition:** Areas covered by boulders or stones that support little or no vegetation.

252E—Bigarm, cool-Rubble land complex, 15 to 30 percent slopes

Setting

- **Landform:** Hills
- **Slope:** 15 to 30 percent
- **Elevation:** 3,200 to 5,200 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 90 to 110 days

Composition

Major Components
- Bigarm and similar soils: 60 percent
- Rubble land: 25 percent

Minor Components
- Hogsby cobbly loam: 0 to 5 percent
- Areas of rock outcrop: 0 to 5 percent
- Slopes greater than 30 percent: 0 to 5 percent

Major Component Description

**Bigarm**
- **Surface layer texture:** Cobbly 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 3.8 inches

Rubble land
- **Definition:** Areas covered by boulders or stones that support 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.

### 252F—Bigarm, cool—Rubble land complex, 30 to 60 percent slopes

**Setting**

- **Landform:** Hills
- **Slope:** 30 to 60 percent
- **Elevation:** 3,000 to 5,200 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 90 to 110 days

**Composition**

#### Major Components

- Bigarm and similar soils: 55 percent
- Rubble land: 30 percent

#### Minor Components

- Hogsby cobbly loam: 0 to 5 percent
- Slopes greater than 60 percent: 0 to 5 percent
- Finleypoint gravelly loam: 0 to 5 percent

**Major Component Description**

**Bigarm**

- **Surface layer texture:** Cobbly 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 4.1 inches

**Rubble land**

**Definition:** Areas covered by boulders or stones that support 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.

### 350B—Bigarm gravelly loam, alluvial, 2 to 8 percent slopes

**Setting**

- **Landform:** Alluvial fans and stream terraces
- **Slope:** 2 to 8 percent
- **Elevation:** 2,600 to 3,600 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 90 to 120 days

**Composition**

#### Major Components

- Bigarm and similar soils: 85 percent

#### Minor Components

- Bigarm, alluvial, stony: 0 to 5 percent
- Yellowbay gravelly loam: 0 to 5 percent
- Slopes greater than 8 percent: 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 4.8 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.

### 350D—Bigarm gravelly loam, alluvial, 8 to 15 percent slopes

**Setting**

- **Landform:** Hills
- **Position on landform:** Footslopes and toeslopes
- **Slope:** 8 to 15 percent
- **Elevation:** 2,600 to 3,600 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Frost-free period:** 90 to 120 days

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

**Management**

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

Major Components
Bigarm and similar soils: 85 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Yellowbay gravelly loam: 0 to 5 percent
Bowlake gravelly loam: 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 4.8 inches

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

350E—Bigarm gravelly loam, alluvial, 15 to 30 percent slopes

Setting
Landform: Hills
Slope: 15 to 30 percent
Elevation: 2,600 to 3,600 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components
Bigarm and similar soils: 85 percent

Minor Components
Yellowbay gravelly loam: 0 to 5 percent
Areas of rock outcrop: 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: Somewhat excessively 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.

350F—Bigarm gravelly loam, alluvial, 30 to 50 percent slopes

Setting
Landform: Hills
Slope: 30 to 50 percent
Elevation: 2,600 to 3,600 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 120 days

Composition

Major Components
Bigarm and similar soils: 85 percent

Minor Components
Yellowbay gravelly loam: 0 to 5 percent
Slopes greater than 50 percent: 0 to 5 percent
Areas of rock outcrop: 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: Somewhat excessively 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.
**Bigbeaver Series**

*Depth class:* Very deep  
*Drainage class:* Poorly drained  
*Permeability:* Moderate  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 2,200 to 2,800 feet  
*Annual precipitation:* 28 to 34 inches  
*Annual air temperature:* 42 to 45 degrees F  
*Frost-free period:* 70 to 105 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, acid, frigid Aeric Fluvaquents

**Typical Pedon**

Bigbeaver silt loam, 0 to 2 percent slopes, in an area of forestland, 2,100 feet south and 1,800 feet west of the northeast corner of sec. 36, T. 23 N., R. 31 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; slightly hard, friable, nonsticky, nonplastic; many very fine and fine roots; strongly acid; clear smooth boundary.

C1—4 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; few distinct yellowish brown (10YR 5/6) redox concentrations; moderate fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; many very fine and fine roots; strongly acid; clear smooth boundary.

C2—9 to 18 inches; brown (pH 5/3) silt loam, light gray (10YR 7/2) dry; few distinct yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; strongly acid; gradual wavy boundary.

C3—18 to 26 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; common distinct yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, nonsticky, nonplastic; common very fine roots; very strongly acid; gradual wavy boundary.

C4—26 to 36 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; common distinct yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, nonsticky, nonplastic; few very fine roots; strongly acid; gradual wavy boundary.

C5—36 to 60 inches; grayish brown (10YR 5/2) stratified silt loam, very fine sandy loam, and loam, light gray (10YR 7/2) dry; common distinct yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, nonsticky, nonplastic; few very fine roots; strongly acid; gradual wavy boundary.

**Range in Characteristics**

*Soil temperature:* 44 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the seasonal high water table:* 12 to 24 inches

**A horizon**

Value: 3, 4, or 5 moist; 5, 6, or 7 dry  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

**C1 horizon**

Value: 3, 4, or 5 moist; 5, 6, or 7 dry  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

**C2 horizon**

Value: 5, 6, or 7 moist; 6, 7, or 8 dry  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

**C3 horizon**

Value: 5, 6, or 7 moist; 6, 7, or 8 dry  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

**C4 horizon**

Value: 5, 6, or 7 moist; 6, 7, or 8 dry  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

**C5 horizon**

Value: 5, 6, or 7 moist; 6, 7, or 8 dry  
Texture: Stratified silt loam, very fine sandy loam, loam, fine sandy loam, or loamy fine sand  
Clay content: 6 to 15 percent  
Reaction: pH 4.5 to 5.5

66A—Bigbeaver silt loam, 0 to 2 percent slopes

**Setting**

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Elevation:* 2,200 to 2,800 feet  
*Mean annual precipitation:* 28 to 34 inches  
*Frost-free period:* 70 to 105 days

**Composition**

**Major Components**

Bigbeaver and similar soils: 90 percent
Minor Components
Oldtrail gravelly sandy loam: 0 to 4 percent
Larchpoint silt loam: 0 to 4 percent
Slopes greater than 2 percent: 0 to 2 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: Forestland
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 10.2 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.

Bigdraw Series
Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Hills
Parent material: Colluvium and residuum derived from semiconsolidated welded tuff
Slope range: 4 to 50 percent
Elevation: 2,600 to 3,700 feet
Annual air temperature: 39 to 43 degrees F
Annual precipitation: 15 to 22 inches
Frost-free period: 90 to 120 days

Taxonomic Class: Fine-loamy, mixed, active, frigid Typic Argixerolls

Typical Pedon
Bigdraw gravelly loam, in an area of Bigdraw-Battlebutte gravelly loams, 4 to 15 percent slopes, in an area of rangeland, 1,650 feet south and 200 feet west of the northeast corner of sec. 35, T. 25 N., R. 23 W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; 25 percent hard pebbles; neutral; clear smooth boundary.

A2—3 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; common very fine tubular pores; 25 percent hard pebbles; slightly acid; clear smooth boundary.

Bt1—9 to 15 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 4/3) moist; moderate fine and medium angular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine and few medium roots; common very fine and fine tubular pores; common prominent clay films on faces of peds and in pores; 5 percent hard cobbles and
15 percent hard pebbles; neutral; clear smooth boundary.

Bt2—15 to 20 inches; light yellowish brown (10YR 6/4) gravelly loam, yellowish brown (10YR 4/4) moist; strong fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine roots; common very fine and fine tubular pores; few faint clay films on faces of peds; 15 percent hard pebbles and 20 percent soft fragments; slightly effervescent, slightly alkaline; clear smooth boundary.

Bk—20 to 28 inches; very pale brown (10YR 7/3) coarse sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky, nonplastic; few fine roots; 10 percent hard pebbles and 45 percent soft fragments; common seams and masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cr—28 to 60 inches; semiconsolidated welded tuff.

Range in Characteristics

Soil temperature: 41 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Cr horizon: 20 to 40 inches
Depth to the Bk horizon: 12 to 28 inches (The lime in this series is believed to be contamination from Glacial Lake Missoula.)

Note: The moist phase generally lacks the lime contamination.

A horizons
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 50 percent—15 to 30 percent hard pebbles; 0 to 5 percent hard cobbles; 0 to 15 percent soft fragments
Reaction: pH 6.1 to 7.3

Bt1 horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 moist
Chroma: 3, 4, or 6
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 10 to 70 percent—10 to 30 percent hard pebbles; 0 to 5 percent hard cobbles; 0 to 35 percent soft fragments
Reaction: pH 6.1 to 7.3

Bt2 horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 moist
Chroma: 3, 4, or 6
Texture: Clay loam or loam
Clay content: 20 to 35 percent
Content of rock fragments: 10 to 70 percent—10 to 30 percent hard pebbles; 0 to 5 percent hard cobbles; 0 to 35 percent soft fragments
Reaction: pH 7.4 to 7.8

Bk horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 3, 4, or 6
Texture: Coarse sandy loam or sandy loam
Clay content: 10 to 18 percent
Content of rock fragments: 35 to 60 percent—10 to 15 percent hard pebbles; 25 to 45 percent soft fragments
Calcium carbonate equivalent: 3 to 10 percent
Reaction: pH 7.4 to 8.4

168D—Bigdraw-Battlebutte gravelly loams, 4 to 15 percent slopes

Setting

Landform:
• Bigdraw—Hills
• Battlebutte—Hills

Position on landform:
• Bigdraw—Footslopes and toeslopes
• Battlebutte—Footslopes and toeslopes

Slope:
• Bigdraw—4 to 15 percent
• Battlebutte—4 to 15 percent

Elevation: 2,600 to 3,700 feet

Mean annual precipitation: 15 to 17 inches

Frost-free period: 90 to 120 days

Composition

Major Components
Bigdraw and similar soils: 60 percent
Battlebutte and similar soils: 30 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Areas of welded tuff outcrop: 0 to 5 percent

Major Component Description

Bigdraw
Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.2 inches
**Battlebutte**

Surface layer texture: Gravelly loam  
Depth class: Shallow (10 to 20 inches)  
Drainage class: Well drained  
Dominant parent material: Tuff residuum  
Native plant cover type: Rangeland  
Flooding: None  
Available water capacity: Mainly 1.9 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.

**Biglake Series**

Depth class: Very deep  
Drainage class: Excessively drained  
Permeability: Moderately rapid to 20 inches; rapid below this depth  
Landform: Alluvial fans, stream terraces, and drainageways  
Parent material: Alluvium  
Slope range: 0 to 8 percent  
Elevation: 2,500 to 3,200 feet  
Annual precipitation: 14 to 16 inches  
Annual air temperature: 42 to 45 degrees F  
Frost-free period: 90 to 120 days  

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Haploxerolls  

**Typical Pedon**

Biglake gravelly loam, 0 to 8 percent slopes, in an area of rangeland, 1,600 feet south and 2,200 feet east of the northwest corner of sec. 27, T. 24 N., R. 24 W.

A—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium and few coarse roots; 20 percent pebbles; neutral; clear wavy boundary.

Bw—9 to 20 inches; brown (10YR 5/3) very cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 20 percent cobbles and 30 percent pebbles; neutral; clear wavy boundary.  

C—20 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; 20 percent cobbles and 50 percent pebbles; neutral.

**Range in Characteristics**

Soil temperature: 43 to 47 degrees F  
Moisture control section: Between 12 and 35 inches  
Thickness of the mollic epipedon: 8 to 16 inches  

A horizon  
Value: 4 or 5 dry; 2 or 3 moist  
Chroma: 2 or 3  
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 6.6 to 7.3  

Bw horizon  
Value: 5 or 6 dry; 3 or 4 moist  
Chroma: 2 or 3  
Clay content: 5 to 10 percent  
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent pebbles  
Reaction: pH 6.6 to 7.3  

C horizon  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Texture: Loamy sand or sand  
Clay content: 0 to 10 percent  
Content of rock fragments: 60 to 80 percent—10 to 20 percent stones and cobbles; 50 to 60 percent pebbles  
Reaction: pH 6.6 to 7.3  

91B—Biglake gravelly loam, 0 to 8 percent slopes

**Setting**

Landform: Alluvial fans, stream terraces, and drainageways  
Slope: 0 to 8 percent  
Elevation: 2,500 to 3,200 feet  
Mean annual precipitation: 14 to 16 inches  
Frost-free period: 90 to 120 days  

**Composition**

Major Components  
Biglake and similar soils: 90 percent
Minor Components
Slopes greater than 8 percent: 0 to 4 percent
Biglake very cobbly loam: 0 to 4 percent
Bowlake gravelly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.0 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.

Bignell Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Stream terraces and mountains
Parent material: Colluvium from tertiary sediments
Slope range: 0 to 35 percent
Elevation range: 2,600 to 4,000 feet
Annual precipitation: 24 to 28 inches
Annual air temperature: 40 to 44 degrees F
Frost-free period: 70 to 90 days

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

Typical Pedon

Bignell gravelly loam, 4 to 15 percent slopes, in an area of forestland, 300 feet north and 1,300 feet west of the southeast corner of sec. 14, T. 21 N., R. 26 W.

Oi—1 to 0 inches; partially decomposed forest litter.
E—0 to 8 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; 30 percent pebbles; moderately acid; clear wavy boundary.
E/Bt—8 to 19 inches; E part (80 percent) is pink (7.5YR 7/3) gravelly loam, brown (7.5YR 5/3) moist; B part (20 percent) is light brown (7.5YR 6/3) gravelly clay loam, brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few distinct clay films on faces of pedds; common very fine, fine, and medium roots; 5 percent cobbles and 25 percent pebbles; slightly acid; gradual irregular boundary.
Bt/E—19 to 31 inches; B part (60 percent) is brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 4/4) moist; E part (40 percent) is light brown (7.5YR 6/3) gravelly loam, brown (10YR 5/3) moist; strong fine and medium angular blocky structure; very hard, firm, moderately sticky, moderately plastic; common distinct clay films on faces of pedds and pebbles; common very fine, fine, medium, and coarse roots; 5 percent cobbles and 25 percent pebbles; slightly acid; clear wavy boundary.
Bt—31 to 60 inches; brown (7.5YR 5/4) very gravelly clay, dark brown (7.5YR 4/4) moist; strong fine and medium angular blocky structure; very hard, firm, moderately sticky, moderately plastic; common distinct clay films on faces of pedds and pebbles; few very fine, fine, medium, and coarse roots; 10 percent cobbles and 45 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between 4 and 12 inches

E horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry, 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 15 to 60 percent—0 to 30 percent cobbles; 10 to 30 percent pebbles
Reaction: pH 5.1 to 6.5

E/Bt and Bt/E horizons
Hue: 7.5YR or 10YR
Value: E part: 6 or 7 dry, 5, 6, or 5 moist; B part: 5, 6, or 7 dry
Chroma: E part: 2, 3, or 4; B part: 2, 4, or 6
Texture: Loam, sandy clay loam, or clay loam
Clay content: 10 to 25 percent
Content of rock fragments: 15 to 60 percent—0 to 25 percent cobbles; 15 to 50 percent pebbles
Reaction: pH 5.1 to 6.5

Bt horizon
Hue: 7.5YR or 10YR
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 2, 3, 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; 20 to 45 percent pebbles
Reaction: pH 5.1 to 6.5

82B—Bignell gravelly loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,600 to 4,000 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Bignell and similar soils: 90 percent

Minor Components
Rumblecreek gravelly loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 3 percent
Iffgulch and similar 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: Tertiary age sediments
Native plant cover type: Forestland
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.

82D—Bignell gravelly loam, 4 to 15 percent slopes

Setting

Landform: Mountains
Position on landform: Backslopes, footslopes, and side slopes
Slope: 4 to 15 percent
Elevation: 2,600 to 4,000 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Bignell and similar soils: 90 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Bignell gravelly loam, stony: 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: Tertiary age sediments
Native plant cover type: Forestland
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.

82E—Bignell gravelly loam, 15 to 35 percent slopes

Setting

Landform: Mountains
Position on landform: Backslopes
Slope: 15 to 35 percent
Elevation: 2,600 to 4,000 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Bignell and similar soils: 90 percent

Minor Components
Slopes greater than 35 percent: 0 to 5 percent
Bignell gravelly loam, stony: 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: Tertiary age sediments
Native plant cover type: Forestland
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.
A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

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

**Blackcreek Series**

Depth class: Very deep  
Drainage class: Poorly drained  
Permeability: Moderate  
Landform: Stream terraces and outwash plains  
Parent material: Alluvium  
Slope range: 0 to 2 percent  
Elevation range: 3,300 to 3,800 feet  
Annual precipitation: 24 to 30 inches  
Annual air temperature: 42 to 45 degrees F  
Frost-free period: 70 to 90 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, calcareous, frigid Typic Endoaquepts

**Typical Pedon**

Blackcreek silt loam, 0 to 2 percent slopes, in an area of forestland, 300 feet south and 2,300 feet east of the northwest corner of sec. 5, T. 26 N., R. 27 W.

A—0 to 4 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; neutral; clear wavy boundary.

Bw—4 to 10 inches; dark gray (10YR 4/1) silt, gray (10YR 6/1) dry; weak medium platy structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium roots; neutral; clear wavy boundary.

Bk—10 to 27 inches; olive gray (5Y 5/2) silt loam, light gray (5Y 7/2) dry; few fine faint dark brown (10YR 4/3) redox concentrations; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few medium roots; few fine masses of lime; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—27 to 36 inches; gray (5Y 6/1) silt, white (5Y 8/1) dry; common fine distinct dark brown (10YR 4/3) redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2—36 to 42 inches; light gray (5Y 7/2) silt, white (5Y 8/2) dry; many prominent medium yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; neutral; gradual wavy boundary.

2C3—42 to 60 inches; gray (10YR 5/1) stratified loamy coarse sand and silt, light gray (10YR 6/1) dry; massive; slightly hard, friable, slightly sticky, slightly plastic; slightly acid.

**Range in Characteristics**

Soil temperature: 44 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Depth to the seasonal high water table: 12 to 24 inches

A horizon  
Value: 2 or 3 moist; 3 or 4 dry  
Clay content: 12 to 18 percent  
Reaction: pH 5.6 to 7.3

Bw horizon  
Value: 3 or 4 moist; 5 or 6 dry  
Texture: Silt or silt loam  
Clay content: 8 to 12 percent  
Reaction: pH 6.1 to 7.3

Bk horizon  
Value: 5 or 6 moist; 6 or 7 dry  
Clay content: 8 to 12 percent  
Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.4 to 8.4

C1 horizon  
Value: 6 or 7 moist; 7 or 8 dry  
Texture: Silt or silt loam  
Clay content: 8 to 12 percent  
Reaction: pH 7.4 to 8.4

C2 horizon  
Value: 6 or 7 moist; 7 or 8 dry  
Texture: Silt or silt loam  
Clay content: 0 to 10 percent  
Reaction: pH 5.6 to 7.3

2C3 horizon  
Value: 5 or 6 moist; 6 or 7 dry  
Clay content: 0 to 10 percent  
Reaction: pH 5.6 to 7.3

**74A—Blackcreek silt loam, 0 to 2 percent slopes**

**Setting**

Landform: Stream terraces and outwash plains  
Slope: 0 to 2 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Blackcreek and similar soils: 90 percent

Minor Components
Tallcreek silt loam: 0 to 5 percent
Meadowpeak, occasionally flooded: 0 to 4 percent
Slopes greater than 2 percent: 0 to 1 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: Forestland
Flooding: Rare
Water table: Apparent
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.

Blacklake Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate
Landform: Closed depressions
Parent material: Alluvium
Slope range: 0 to 1 percent
Elevation range: 3,300 to 3,800 feet
Annual precipitation: 24 to 30 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Coarse-silty, mixed, superactive, nonacid, frigid Histic Humaquepts

Typical Pedon
Blacklake mucky peat, 0 to 1 percent slopes, in an area of wet meadow hayland, 400 feet north and 1,000 feet east of the southwest corner of sec. 7, T. 26 N., R. 26 W. (Flathead County, Montana)

Oe—0 to 9 inches; very dark brown (10YR 2/2) broken face and rubbed mucky peat (hemic material); 70 percent fiber and raw herbaceous material—30 percent rubbed; weak thin platy structure parting to weak fine granular; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; moderately acid; clear smooth boundary.

Oe/C—9 to 14 inches; stratified black (10YR 2/1) broken face and rubbed mucky peat (hemic material) 80 percent fiber and raw herbaceous material—30 percent rubbed (80 percent) and very dark gray (10YR 3/1) mucky silt loam (20 percent); moderate thin platy structure parting to moderate fine granular; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine roots; moderately acid; abrupt wavy boundary.

C/Oa—14 to 31 inches; stratified very dark grayish brown (10YR 3/2) mucky silt loam (70 percent) and dark gray (10YR 4/1) silt loam (20 percent) and black (10YR 2/1) muck (10 percent); weak medium subangular blocky structure parting to weak very fine granular; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; moderately acid; clear wavy boundary.

C—31 to 57 inches; stratified light brownish gray (10YR 6/2) very fine sandy loam and silt loam (70 percent) and light gray (10YR 7/2) silt (30 percent); massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; moderately acid; abrupt wavy boundary.

C/Oa’—57 to 60 inches; stratified very dark gray (10YR 3/1) mucky silt loam (80 percent) and black (10YR 2/1) mound (20 percent); massive; slightly hard, friable, slightly sticky, slightly plastic; moderately acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Thickness of organic material: 8 to 16 inches
Depth to the seasonal high water table: 0 to 12 inches

Oe horizon
Value: 2 or 3
Chroma: 1 or 2
Fiber content: 50 to 80 percent unrubbed; 20 to 30 percent rubbed
Reaction: pH 5.6 to 7.3

Oe/C horizon
Value: Oe part: 2 or 3; C part: 2 or 3 moist
Chroma: Oe part: 1 or 2; C part: 1 or 2
Fiber content: 50 to 80 percent unrubbed; 20 to 30 percent rubbed
Reaction: pH 5.6 to 7.3
Texture: Silt loam or mucky silt loam
Clay content: 5 to 15 percent
Reaction: pH 5.6 to 7.3

**C/Oa and C/Oa’ horizons**
- Hue: C part: 10YR or 2.5Y
- Value: C part: 2, 3, 4, or 5
- Chroma: C part: 1 or 2
- Texture: C part: Silt loam, mucky silt loam, silt, or very fine sandy loam
Clay content: C part: 4 to 12 percent
Reaction: C part: pH 5.6 to 6.5; Oa’ part: pH 5.6 to 6.5
Fiber content: Oa’ part: 30 to 50 percent unrubbed; less than 20 percent rubbed

**C horizon**
- Hue: 10YR or 2.5Y
- Value: 6 or 7
- Chroma: 1 or 2
- Texture: Silt, very fine sandy loam, or silt loam
Clay content: 4 to 12 percent
Reaction: pH 5.6 to 6.5

**72A—Blacklake mucky peat,**
**0 to 1 percent slopes**

**Setting**
- Landform: Closed depressions
- Slope: 0 to 1 percent
- Elevation: 3,300 to 3,800 feet
- Mean annual precipitation: 24 to 30 inches
- Frost-free period: 70 to 90 days

**Composition**

**Major Components**
- Blacklake and similar soils: 90 percent

**Minor Components**
- McLangor mucky peat: 0 to 8 percent
- Meadowpeak, occasionally flooded: 0 to 2 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: Alluvium
- Native plant cover type: Rangeland
- Flooding: None
- Water table: Apparent
- Available water capacity: Mainly 14.2 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.

**Bohnly Series**

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderate
**Landform:** Flood plains
**Parent material:** Alluvium
**Slope range:** 0 to 2 percent
**Elevation:** 2,500 to 3,500 feet
**Annual precipitation:** 12 to 14 inches
**Annual air temperature:** 39 to 45 degrees F
**Frost-free period:** 100 to 120 days

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

**Typical Pedon**

Bohnly silt loam, 0 to 2 percent slopes, in an area of pasture, 800 feet north and 1,400 feet west of the southeast corner of sec. 10, T. 23 N., R. 24 W.

- A—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; neutral; clear smooth boundary.
- Bw—8 to 13 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; neutral; gradual smooth boundary.
- Cg1—13 to 28 inches; dark gray (5Y 4/1) silty clay loam, gray (5Y 6/1) dry; common fine distinct strong brown (7.5YR 5/6) redox concentrations; massive; slightly hard, friable, moderately sticky, moderately plastic; neutral; gradual smooth boundary.
- Cg2—28 to 60 inches; gray (5Y 5/1) silty clay loam, light gray (5Y 7/1) dry; common fine distinct strong brown (7.5YR 5/8) redox concentrations; massive; slightly hard, friable, moderately sticky, moderately plastic; neutral.

**Range in Characteristics**

- Soil temperature: 41 to 47 degrees F
- Moisture control section: Between 4 and 12 inches
- Thickness of the mollic epipedon: 7 to 12 inches
- Depth to the seasonal high water table: 6 to 24 inches
A horizon
Value: 2 or 3 moist; 4 or 5 dry
Chroma: 1 or 2
Clay content: 18 to 27 percent
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 4 or 5 moist; 5 or 6 dry
Chroma: 1 or 2
Texture: Silt loam or silty clay loam
Clay content: 18 to 32 percent
Reaction: pH 6.6 to 7.3

Cg horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5 moist; 5, 6, or 7 dry
Texture: Silt loam or silty clay loam
Clay content: 18 to 32 percent
Reaction: pH 6.6 to 7.3

10A—Bohnly silt loam, 0 to 2 percent slopes

Setting
Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Bohnly and similar soils: 85 percent

Minor Components
Sonyok silty clay loam: 0 to 5 percent
Camascreek silt loam: 0 to 4 percent
Bolack silt loam: 0 to 3 percent
Aeric Haplaquepts: 0 to 3 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: Occasional
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.

Bolack Series
Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 100 to 120 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Endoaquolls

Typical Pedon
Bolack silt loam, 0 to 2 percent slopes, in an area of pasture, 900 feet south and 600 feet west of the northeast corner of sec. 18, T. 22 N., R. 23 W.

A—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine and medium subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; many very fine, fine, and medium and few coarse roots; neutral; clear wavy boundary.

Bg1—7 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 6/1) dry; weak coarse prismatic structure parting to strong fine subangular blocky; hard, very firm, very sticky, very plastic; common very fine and fine roots; neutral; gradual wavy boundary.

Bg2—10 to 16 inches; dark gray (10YR 4/1) silty clay, gray (10YR 6/1) dry; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, very firm, very sticky, very plastic; few very fine roots; neutral; gradual wavy boundary.

C1—16 to 35 inches; grayish brown (2.5Y 5/2) silty clay, light brownish gray (2.5Y 6/2) dry; common fine distinct strong brown (7.5YR 5/6) redox concentrations; massive; hard, very firm, very sticky, very plastic; slightly alkaline; gradual wavy boundary.

C2—35 to 60 inches; grayish brown (2.5Y 5/2) silty clay, light gray (2.5Y 7/2) dry; common fine distinct strong brown (7.5YR 5/8) redox concentrations; massive; hard, very firm, very
sticky, very plastic; slightly effervescent; moderately alkaline.

**Range in Characteristics**

Soil temperature: 43 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Thickness of the mollic epipedon: 7 to 20 inches  
Depth to the seasonal high water table: 12 to 24 inches

A horizon  
Value: 2 or 3 moist; 3, 4, or 5 dry  
Clay content: 18 to 27 percent  
Reaction: pH 6.6 to 7.3

Bg horizons  
Value: 3 or 4 moist; 5 or 6 dry  
Chroma: 1 or 2  
Texture: Silty clay or silty clay loam  
Clay content: 27 to 45 percent  
Reaction: pH 6.6 to 7.3

C horizons  
Hue: 2.5Y, 5Y, or N  
Value: 4 or 5 moist; 6 or 7 dry  
Chroma: 0, 1, or 2  
Texture: Clay or silty clay  
Clay content: 40 to 50 percent  
Reaction: pH 7.4 to 8.4

**11A—Bolack silt loam, 0 to 2 percent slopes**

**Setting**

Landform: Flood plains  
Slope: 0 to 2 percent  
Elevation: 2,500 to 3,000 feet  
Mean annual precipitation: 12 to 14 inches  
Frost-free period: 100 to 120 days

**Composition**

**Major Components**  
Bolack and similar soils: 85 percent  

**Minor Components**  
Sonyok silty clay loam: 0 to 9 percent  
Camascreek silt loam: 0 to 4 percent  
Areas of open water: 0 to 2 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: Occasional  
Water table: Apparent  
Available water capacity: Mainly 9.3 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.

**Bonnash Series**

Depth class: Very deep  
Drainage class: Well drained  
Permeability: Moderate  
Landform: Stream terraces  
Parent material: Volcanic ash over mixed alluvium and glacial outwash  
Slope range: 0 to 35 percent  
Elevation range: 2,200 to 2,600 feet  
Annual precipitation: 24 to 28 inches  
Annual air temperature: 42 to 45 degrees F  
Frost-free period: 90 to 105 days

**Taxonomic Class:** Ashy over loamy-skeletal, amorphic over mixed, superactive, frigid Typic Udivitrands

**Typical Pedon**

Bonnash gravelly silt loam, 0 to 4 percent slopes, in an area of forestland, 1,000 feet north and 900 feet west of the southeast corner of sec. 16, T. 23 N., R. 30 W.

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

A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; clear wavy boundary.

Bw1—3 to 14 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; gradual wavy boundary.
Bw2—14 to 24 inches; yellowish brown (10YR 5/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; gradual irregular boundary.

2E/Bw—24 to 35 inches; E part (60 percent) is yellowish brown (10YR 5/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) dry; Bw part (40 percent) is dark yellowish brown (10YR 4/6) very gravelly sandy loam, yellowish brown (10YR 5/6) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; 10 percent cobbles and 30 percent pebbles; moderately acid; clear wavy boundary.

2C—35 to 60 inches; yellowish brown (10YR 5/4) extremely cobbly loamy coarse sand, light yellowish brown (10YR 6/4) dry; single grain; loose, nonsticky, nonplastic; few fine, medium, and coarse roots; 25 percent cobbles and 40 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Volcanic ash mantle: 14- to 28-inches thick
Volcanic glass content in the 0.02 to 2.0 mm fraction: 5 to 30 percent
Acid oxalate extractable Al + ½ Fe: 0.4 to 2.0 percent
Phosphate retention: 25 to 90 percent
15-bar water retention on air-dried samples: 5 to 12 percent

A horizon
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

Bw horizons
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

2E/Bw horizon
Value: E part: 5, 6, or 7 dry; 4, 5, or 6 moist; 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 2 to 10 percent
Content of rock fragments: 35 to 55 percent—5 to 15 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

2C horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: 2 to 10 percent
Content of rock fragments: 60 to 90 percent—20 to 40 percent cobbles; 40 to 50 percent pebbles
Reaction: pH 5.6 to 7.3

60B—Bonnash gravelly silt loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Bonnash and similar soils: 90 percent

Minor Components
Slopes greater than 4 percent: 0 to 5 percent
Glaciercreek: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.
860D—Bonnash gravelly silt loam, 4 to 15 percent slopes

**Setting**

*Landform:* Stream terraces  
*Position on landform:* Treads  
*Slope:* 4 to 15 percent  
*Elevation:* 2,200 to 2,600 feet  
*Mean annual precipitation:* 24 to 28 inches  
*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**  
Bonnash and similar soils: 90 percent

**Minor Components**  
Slopes greater than 15 percent: 0 to 5 percent  
Glaciercreek: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Volcanic ash over alluvium or outwash  
*Native plant cover type:* Forestland  
*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.

860E—Bonnash gravelly silt loam, 15 to 35 percent slopes

**Setting**

*Landform:* Stream terraces  
*Position on landform:* Risers  
*Slope:* 15 to 35 percent  
*Elevation:* 2,200 to 2,600 feet  
*Mean annual precipitation:* 24 to 28 inches  
*Frost-free period:* 90 to 105 days

**Composition**

**Major Components**  
Bonnash and similar soils: 85 percent  
Glaciercreek: 0 to 6 percent

**Minor Components**  
Slopes greater than 35 percent: 0 to 9 percent

**Major Component Description**

*Surface layer texture:* Gravelly silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Volcanic ash over alluvium or outwash  
*Native plant cover type:* Forestland  
*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.

**Bowlake Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Slow  
*Landform:* Alluvial fans, stream terraces, drainageways, and giant ripple marks  
*Parent material:* Tertiary sediments and alluvium  
*Slope range:* 0 to 8 percent  
*Elevation:* 2,800 to 3,400 feet  
*Annual precipitation:* 13 to 16 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 100 to 125 days

**Taxonomic Class:** Fine, illitic, frigid Calcic Argixerolls

**Typical Pedon**

Bowlake gravelly loam in an area of Bowlake-Minesinger gravelly loams, 2 to 8 percent slopes, in an area of pasture, 40 feet south and 2,400 feet west of the northeast corner of sec. 10, T. 19 N., R. 24 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and common medium and coarse roots; 15 percent pebbles; neutral; clear smooth boundary.

AB—7 to 9 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; soft, very friable,
slightly sticky, slightly plastic; many fine and few medium roots; 20 percent pebbles; neutral; clear smooth boundary.

**Bt**—9 to 24 inches; pale brown (10YR 6/3) gravelly silty clay, brown (10YR 4/3) moist; strong fine and medium angular blocky structure; hard, firm, moderately sticky, very plastic; common fine roots; common distinct clay films on faces of peds and lining pores; 20 percent pebbles; neutral; gradual smooth boundary.

**Bk**—24 to 60 inches; light yellowish brown (10YR 6/4) gravelly silty clay, dark yellowish brown (10YR 4/4) moist; moderate medium angular blocky structure; hard, very firm, moderately sticky, very plastic; few fine roots; 25 percent pebbles; few fine masses of lime; strongly effervescent; moderately alkaline.

**Range in Characteristics**

**Thickness of the mollic epipedon:** 7 to 10 inches

**Soil temperature:** 41 to 45 degrees F

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

**Depth to the Bk horizon:** 18 to 35 inches

**Ap horizon**
- **Value:** 4 or 5 dry; 2 or 3 moist
- **Chroma:** 2 or 3
- **Clay content:** 20 to 27 percent
- **Content of rock fragments:** 15 to 30 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 15 to 20 percent pebbles
- **Reaction:** pH 6.6 to 7.3

**AB horizon**
- **Value:** 5 or 6 dry; 3 or 4 moist
- **Chroma:** 2 or 3
- **Texture:** Loam or clay loam
- **Clay content:** 20 to 40 percent
- **Content of rock fragments:** 5 to 30 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 20 percent pebbles
- **Reaction:** pH 6.6 to 7.8

**Bt horizon**
- **Hue:** 10YR or 7.5YR
- **Value:** 6 or 7 dry; 4 or 5 moist
- **Chroma:** 3, 4, or 6
- **Texture:** Silty clay loam, silty clay, or clay
- **Clay content:** 35 to 60 percent
- **Content of rock fragments:** 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles
- **Reaction:** pH 6.6 to 8.4

**Bk horizon**
- **Value:** 6 or 7 dry; 4 or 5 moist
- **Chroma:** 3 or 4
- **Clay content:** 40 to 45 percent
- **Content of rock fragments:** 5 to 50 percent—0 to 10 percent cobbles; 5 to 40 percent pebbles
- **Calcium carbonate equivalent:** 5 to 15 percent
- **Reaction:** pH 7.9 to 8.4

**56A—Bowlake gravelly loam, 0 to 2 percent slopes**

**Setting**

- **Landform:** Alluvial fans, stream terraces, and drainageways
- **Slope:** 0 to 2 percent
- **Elevation:** 2,800 to 2,900 feet
- **Mean annual precipitation:** 14 to 16 inches
- **Frost-free period:** 100 to 120 days

**Composition**

**Major Components**
- Bowlake and similar soils: 85 percent

**Minor Components**
- Remount very gravelly loam: 0 to 5 percent
- Camascreek silt loam: 0 to 5 percent
- Slopes greater than 2 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:** Tertiary age sediments
- **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.

**56B—Bowlake-Minesinger gravelly loams, 2 to 8 percent slopes**

**Setting**

- **Landform:**
  - Bowlake—Alluvial fans
  - Minesinger—Alluvial fans
Position on landform:
- Bowlake—Backslopes, footslopes, and side slopes
- Minesinger—Backslopes, footslopes, and side slopes

Slope:
- Bowlake—2 to 8 percent
- Minesinger—2 to 8 percent

Elevation: 2,900 to 3,400 feet
Mean annual precipitation: 14 to 16 inches
Frost-free period: 100 to 120 days

Composition

Major Components
Bowlake and similar soils: 55 percent
Minesinger and similar soils: 30 percent

Minor Components
Camascreek silt loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent
Minesinger stony loam: 0 to 5 percent

Major Component Description

Bowlake
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Tertiary age sediments
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.8 inches

Minesinger
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Tertiary age sediments
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.

Cabinet Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Lake plains or terraces

Parent material: Volcanic ash over glaciolacustrine deposits
Slope range: 4 to 30 percent
Elevation range: 2,200 to 2,700 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Clayey over loamy, mixed, active, frigid Andic Hapludalfs

Typical Pedon

Cabinet silt loam, in an area of Cabinet silt loam, 4 to 15 percent slopes, in an area of forestland, ¼-mile west of the Montana state line along a paved road about 20 feet south of the road, 1,150 feet north and 800 feet west of the southeast corner, sec. 34, T. 55 N., R. 3 E. (Bonner County, Idaho)

Oi—0.5 to 0 inches; undecomposed and decomposed forest litter.
A—0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine and few medium roots; many very fine and common fine tubular pores; slightly acid; clear wavy boundary.
Bw—3 to 11 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common very fine and few fine and medium roots; common very fine and few fine tubular pores; slightly acid; abrupt wavy boundary.
2E/Bt—11 to 19 inches; E part (80 percent) is white (10YR 8/2) silty clay loam, brown (10YR 5/3) moist; B part (20 percent) is pink (7.5YR 7/4) clay, brown (7.5YR 5/4) moist; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; very hard, very firm, slightly sticky, moderately plastic; common very fine and few roots matted on the exterior of peds; common very fine and few fine tubular pores; many distinct clay films in pores and on faces of peds; few fine manganese concretions; strongly acid; clear wavy boundary.
2Bt1—19 to 27 inches; pink (7.5YR 7/4) clay, brown (7.5YR 5/4) moist; moderate very coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, very sticky, very plastic; few very fine and fine roots matted on exterior of peds; few very fine and fine tubular pores; many distinct clay films in
pores and on faces of peds; few fine manganese concretions and stains; reddish gray (5YR 5/2) coats on faces of peds; very strongly acid; gradual wavy boundary.

2Bt2—27 to 35 inches; pink (7.5YR 7/4) clay, reddish brown (5YR 5/3) moist; weak very coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, very sticky, very plastic; few very fine and fine roots matted on exterior of peds; few very fine and fine tubular pores; many distinct clay films in pores and on faces of peds; common medium manganese stains; pinkish gray (5YR 6/2) and brown (7.5YR 5/4) coats on faces of peds; very strongly acid; abrupt wavy boundary.

3Bt3—35 to 43 inches; pink (7.5YR 7/4) very fine sandy loam, light reddish brown (5YR 6/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine tubular and irregular pores; few thin clay bridges between mineral grains; few fine manganese stains; 1/4-inch thick discontinuous band of iron stain across horizon; brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) coats on faces of peds; very strongly acid; abrupt wavy boundary.

3Bt4—43 to 49 inches; pink (7.5YR 7/4) clay, light reddish brown (5YR 6/3) moist; weak coarse subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine and fine roots; few very fine vesicular pores; common distinct clay films in pores and on faces of peds; common medium and large distinct light gray (5YR 7/1) and pinkish gray (5YR 6/2) moist iron depletions; many medium manganese stains; many medium silt coats on faces of peds; strongly acid; abrupt wavy boundary.

3Bt5—49 to 54 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine irregular pores; few thin clay bridges between mineral grains; common medium manganese stains; many medium silt coats on faces of peds; strongly acid; abrupt wavy boundary.

3Bt6—54 to 60 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) dry; weak coarse subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine vesicular pores; common distinct clay films in pores and on faces of peds; many large manganese stains; strongly acid.

**Range in Characteristics**

*Soil temperature:* 43 to 45 degrees F

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

***Depth to the seasonal perched water table:*** 10 to 24 inches, February through April

**A horizon**

*Chroma:* 2 or 3 moist  
*Moist bulk density:* 0.85 to 1.0 g/cm³  
*Acid oxalate extractable Al + 1/2 Fe:* 1 to 2 percent  
*Reaction:* pH 5.6 to 7.3

**Bw horizon**

*Hue:* 10YR or 7.5YR  
*Value:* 4 or 5 moist  
*Chroma:* 3 to 6  
*Moist bulk density:* 0.85 to 1.0 g/cm³  
*Acid oxalate extractable Al + 1/2 Fe:* 1 to 2 percent  
*Reaction:* pH 5.6 to 7.3

**2E/Bt horizon**

*Chroma:* 2 or 3  
*Texture:* Silt loam, silty clay loam, or clay  
*Base saturation by sum of cations:* 45 to 60 percent  
*Reaction:* pH 5.1 to 6.0

**2Bt horizons**

*Hue:* 10YR, 7.5YR, or 5YR  
*Value:* 4 to 7 moist  
*Chroma:* 2 to 4 dry  
*Coatings on faces of peds:* Hue: 5YR or 7.5YR;  
*Value:* 5 to 7 dry, 4 to 7 moist; Chroma: 2 to 6 moist  
*Texture:* Clay or silty clay  
*Base saturation by sum of cations:* 50 to 60 percent  
*Reaction:* pH 4.5 to 6.0

**3Bt horizons**

*Hue:* 5YR or 7.5YR  
*Value:* 6 or 7 dry; 5 or 6 moist  
*Chroma:* 3 or 4 dry or moist  
*Coatings on faces of peds and redox features:*  
*Hue:* 5YR or 7.5YR  
*Value:* 5 to 7 dry; 4 to 6 moist  
*Chroma:* 2 to 4 dry or moist  
*Texture:* Stratified very fine sandy loam to clay  
*Reaction:* pH 4.5 to 6.0

**Camascreek Series**

*Depth class:* Very deep  
*Drainage class:* Somewhat poorly drained  
*Permeability:* Very slow  
*Landform:* Alluvial fans, stream terraces, and drainageways  
*Parent material:* Alluvium
**Slope range:** 0 to 2 percent  
**Elevation:** 2,700 to 2,900 feet  
**Annual precipitation:** 12 to 14 inches  
**Annual air temperature:** 41 to 45 degrees F  
**Frost-free period:** 100 to 120 days

**Taxonomic Class:** Fine, mixed, superactive, frigid Aquic Natrixerolls

**Typical Pedon**
Camascreek silt loam, 0 to 2 percent slopes, in an area of rangeland, 250 feet north and 1,750 feet east of the southwest corner of sec. 26, T. 20 N., R. 24 W.

A1—0 to 8 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate medium platy structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine and common medium roots; many very fine and fine pores; disseminated lime; strongly effervescent; very strongly alkaline; clear smooth boundary.

A2—8 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to strong very fine and fine angular blocky; slightly hard, firm, slightly sticky, moderately plastic; common fine and medium and few coarse roots; few very fine pores; disseminated lime; violently effervescent; strongly alkaline; clear smooth boundary.

Btnk1—15 to 23 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; weak medium prismatic structure parting to strong very fine and medium angular and subangular blocky; very hard, very firm, moderately sticky, very plastic; few fine roots; common very fine and fine pores; common distinct clay films on faces of peds and in pores; common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Btnk2—23 to 43 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; common faint grayish brown (2.5Y 5/2) redox depletions; weak medium and coarse subangular blocky structure; hard, very firm, moderately sticky, very plastic; few fine roots; common fine and medium pores; few distinct clay films on faces of peds; common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

BC—43 to 60 inches; light yellowish brown (10YR 6/4) silty clay, dark yellowish brown (10YR 4/4) moist; common distinct grayish brown (2.5Y 5/2) redox depletions; massive; very hard, very firm, moderately sticky, very plastic; few fine pores; disseminated lime; slightly effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature:** 42 to 46 degrees F  
**Moisture control section:** Between 4 and 12 inches  
**Depth to the seasonal high water table:** 24 to 42 inches  
**Thickness of the mollic epipedon:** 7 to 16 inches  
**Depth to the Btnk horizon:** 10 to 20 inches  
**Note:** In some pedons, 1 to 2 inches of the surface layer is noncalcareous, but, when mixed to 7 inches, the surface layer is calcareous throughout.

**A1 horizon**
- Value: 2 or 3 moist; 4 or 5 dry  
- Chroma: 1 or 2  
- Clay content: 20 to 27 percent  
- Calcium carbonate equivalent: 3 to 10 percent  
- Electrical conductivity (mmhos/cm): 0 to 4  
- Sodium adsorption ratio: 13 to 40  
- Reaction: pH 8.5 to 9.6

**A2 horizon**
- Value: 3 or 4 moist; 5 or 6 dry  
- Chroma: 2 or 3  
- Texture: Silt loam or silty clay loam  
- Clay content: 20 to 35 percent  
- Calcium carbonate equivalent: 5 to 10 percent  
- Electrical conductivity (mmhos/cm): 0 to 4  
- Sodium adsorption ratio: 13 to 30  
- Reaction: pH 8.5 to 9.0

**Btnk1 horizon**
- Value: 4 or 5 moist; 6 or 7 dry  
- Chroma: 3 or 4  
- Texture: Silty clay or silty clay loam  
- Clay content: 35 to 60 percent  
- Calcium carbonate equivalent: 3 to 8 percent  
- Electrical conductivity (mmhos/cm): 0 to 4  
- Sodium adsorption ratio: 10 to 20  
- Reaction: pH 7.9 to 9.0

**Btnk2 horizon**
- Hue: 10YR or 2.5Y  
- Value: 4 or 5 moist; 6 or 7 dry  
- Chroma: 3 or 4  
- Texture: Silty clay or silty clay loam  
- Clay content: 35 to 55 percent  
- Calcium carbonate equivalent: 1 to 3 percent  
- Electrical conductivity (mmhos/cm): 0 to 4  
- Sodium adsorption ratio: 5 to 13  
- Reaction: pH 7.9 to 8.4

**BC horizon**
- Hue: 10YR or 2.5Y  
- Value: 4, 5, or 6 moist; 5, 6, or 7 dry  
- Chroma: 1, 2, 3, or 4
Texture: Silty clay or silty clay loam
Clay content: 35 to 55 percent
Electrical conductivity (mmhos/cm): 0 to 4
Sodium adsorption ratio: 0 to 13
Reaction: pH 7.4 to 8.4

90A—Camascreek silt loam, 
0 to 2 percent slopes

Setting
Landform: Alluvial fans, stream terraces, and drainageways
Slope: 0 to 2 percent
Elevation: 2,700 to 2,900 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Camascreek and similar soils: 90 percent
Minor Components
Marklepass silty clay loam: 0 to 4 percent
Sonyok silty clay loam: 0 to 3 percent
Slopes greater than 2 percent: 0 to 3 percent

Major Component Description
Surface layer texture: Silt 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
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.3 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.

Clearcreek Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 100 to 120 days

Taxonomic Class: Fine-silty, mixed, superactive, nonacid, frigid Oxyaquic Xerofluvents

Typical Pedon
Clearcreek silt loam, 0 to 2 percent slopes, in an area of pasture, 3,230 feet south and 300 feet east of the northwest corner of sec. 29, T. 20 N., R. 22 W.

A—0 to 6 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many fine and coarse and common medium roots; few fine interstitial and tubular pores; slightly alkaline; clear smooth boundary.

C1—6 to 16 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium platy structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and few medium and coarse roots; few fine tubular pores; slightly alkaline; clear smooth boundary.

C2—16 to 35 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium angular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; common fine and few medium roots; common tubular pores; slightly alkaline; gradual smooth boundary.

C3—35 to 60 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; few fine and medium roots; few fine pores; moderately alkaline.

Range in Characteristics
Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the seasonal high water table: 42 to 60 percent

A horizon
Hue: 2.5Y or 10YR
Value: 3 or 4 moist; 5 or 6 dry
Chroma: 2 or 3
Clay content: 10 to 27 percent
Reaction: pH 6.6 to 7.8

C1 horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 2 or 3
Clay content: 10 to 27 percent
Reaction: pH 6.6 to 7.8

C2 and C3 horizons
Hue: 2.5Y or 10YR
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 2 or 3
Texture: Silty clay loam or silt loam
Clay content: 18 to 35 percent
Reaction: pH 7.4 to 8.4

96A—Clearcreek silt loam, 0 to 2 percent slopes

Setting
Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Clearcreek and similar soils: 85 percent

Minor Components
Aeric Haplaquepts: 0 to 5 percent
Camascreek silt loam: 0 to 5 percent
Marklepass silty clay loam: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 11.2 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.

Combest Series
Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Mountains and stream terraces

Parent material: Volcanic ash over colluvium
Slope range: 4 to 70 percent
Elevation range: 2,400 to 5,000 feet
Annual precipitation: 19 to 28 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Haplustepts

Typical Pedon
Combest gravelly silt loam, 35 to 60 percent slopes, in an area of forestland, 1,800 feet north and 800 feet west of the southeast corner of sec. 28, T. 20 N., R. 27 W.

Oi—2 to 0 inches; undecomposed and slightly decomposed forest litter.
A—0 to 2 inches; very dark brown (10YR 2/2) gravelly silt loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; volcanic ash component; 20 percent pebbles; neutral; clear smooth boundary.
Bw—2 to 10 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; 30 percent pebbles; slightly acid; abrupt wavy boundary.
2E—10 to 24 inches; grayish brown (10YR 5/2) very gravelly sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; 15 percent cobbles and 40 percent pebbles; slightly acid; gradual wavy boundary.
2E/Bw—24 to 60 inches; E part (80 percent) is grayish brown (10YR 5/2) extremely cobbly sandy loam, light gray (10YR 7/2) dry; E part surrounds the B part; B part (20 percent) is brown (10YR 5/3) extremely cobbly sandy loam, pale brown (10YR 6/3) dry; massive; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 30 percent cobbles and 40 percent pebbles; moderately acid.

Range in Characteristics
Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 35 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + \(\frac{1}{2}\)Fe: 0.4 to 1.0 percent
Reaction: pH 5.6 to 6.5

**Bw horizon**
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + \(\frac{1}{2}\)Fe: 1.00 to 1.25 percent
Reaction: pH 5.6 to 6.5

**2E horizon**
Value: 6 or 7 dry
Chroma: 1, 2, or 3
Texture: Sandy loam or loam
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 75 percent—10 to 20 percent cobbles; 25 to 55 percent pebbles
Reaction: pH 5.6 to 6.5

**2E/Bw horizon**
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: Sandy loam or loam
Clay content: 5 to 10 percent
Content of rock fragments: 60 to 80 percent—30 to 40 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 6.5

**21E—Combest gravelly silt loam, 15 to 35 percent slopes**

**Setting**

*Landform:* Mountains
*Slope:* 15 to 35 percent
*Elevation:* 2,500 to 5,000 feet
*Mean annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Combest and similar soils: 90 percent

**Minor Components**
Winkler gravelly loam: 0 to 5 percent
Slopes greater than 35 percent: 0 to 5 percent

**Major Component Description**
*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Dominant parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*Floodling:* 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.

**21F—Combest gravelly silt loam, 35 to 60 percent slopes**

**Setting**

*Landform:* Mountains
*Slope:* 35 to 60 percent
*Elevation:* 2,500 to 5,000 feet
*Mean annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Combest and similar soils: 85 percent

**Minor Components**
Winkler gravelly loam: 0 to 5 percent
Slopes greater than 60 percent: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Areas of rubble land: 0 to 3 percent

**Major Component Description**
*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Dominant parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*Floodling:* 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.

211G—Combest-Rubble land complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 2,500 to 5,000 feet
Mean annual precipitation: 19 to 22 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Combest and similar soils: 60 percent
Rubble land: 25 percent

Minor Components
Sharrott gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Slopes greater than 70 percent: 0 to 5 percent

Major Component Description
Combest
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.3 inches

Rubble land
Definition: Areas covered by boulders or stones that support 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.

821D—Combest gravelly silt loam, 4 to 15 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,400 to 2,600 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Combest and similar soils: 90 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Combest
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
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.

Courvash Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Ground moraines
Parent material: Volcanic ash over glacial till
Slope range: 4 to 35 percent
Elevation range: 2,200 to 2,600 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

A typical soil description with range in characteristics is included, in alphabetical order, in this section.
**Taxonomic Class:** Ashy over loamy-skeletal, amorphic over mixed, superactive, frigid Alfic Udivitrands

**Typical Pedon**

Courvash cobbly silt loam (mixed), 4 to 15 percent slopes, in an area of forestland, 2,400 feet south and 200 feet west of the northeast corner of sec. 10, T. 27 N., R. 33 W.

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

A—0 to 1 inch; very dark brown (10YR 2/2) gravelly silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; 15 percent pebbles; moderately acid; abrupt wavy boundary.

Bw1—1 to 9 inches; dark yellowish brown (10YR 3/4) cobbly silt loam, yellowish brown (10YR 5/4) dry; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; 10 percent cobbles and 20 percent pebbles; moderately acid; gradual wavy boundary.

Bw2—9 to 17 inches; dark yellowish brown (10YR 4/4) cobbly silt loam, light yellowish brown (10YR 6/4) dry; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; 20 percent cobbles and 10 percent pebbles; moderately acid; clear smooth boundary.

2E—17 to 30 inches; pale brown (10YR 6/3) very cobbly loam, very pale brown (10YR 8/3) dry; weak very fine granular structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots; trace stones, 30 percent cobbles, and 15 percent pebbles; moderately acid; gradual wavy boundary.

2Bt/E—30 to 42 inches; B part (60 percent) is dark yellowish brown (10YR 4/4) very cobbly loam, light yellowish brown (10YR 6/4) dry; E part (40 percent) is pale brown (10YR 6/3) very cobbly loam, very pale brown (10YR 8/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium roots; few distinct clay films on faces of peds and in pores; 5 percent stones, 30 percent cobbles, and 15 percent pebbles; moderately acid; gradual wavy boundary.

2Bt—42 to 60 inches; dark yellowish brown (10YR 4/4) very cobbly clay loam, light yellowish brown (10YR 6/4) dry; moderate fine angular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and medium roots; common distinct clay films on faces of peds and in pores; 5 percent stones, 35 percent cobbles, and 15 percent pebbles; moderately acid.

**Range in Characteristics**

*Soil temperature:* 42 to 45 degrees F

*Depth to the 2E horizon:* 16 to 25 inches

*Acid oxalate extractable Al + 1/2 Fe:* 1 to 2 percent

*Phosphate retention:* 25 to 75 percent

*Note:* The combined thickness of the A, Bw1, and Bw2 horizons is 16 to 25 inches.

**A horizon**

*Value:* 4 or 5 dry; 2 or 3 moist

*Chroma:* 2, 3, or 4

*Clay content:* 2 to 10 percent

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

*Moist bulk density:* 0.85 to 1.0 g/cm³

*Reaction:* pH 5.6 to 6.5

**Bw1 horizon**

*Value:* 5 or 6 dry; 3 or 4 moist

*Chroma:* 3, 4, or 6

*Clay content:* 2 to 10 percent

*Content of rock fragments:* 15 to 35 percent—10 to 15 percent cobbles; 5 to 20 percent pebbles

*Moist bulk density:* 0.85 to 1.0 g/cm³

*Reaction:* pH 5.6 to 6.5

**Bw2 horizon**

*Value:* 6 or 7 dry; 4 or 5 moist

*Chroma:* 3, 4, or 6

*Clay content:* 2 to 10 percent

*Content of rock fragments:* 15 to 35 percent—10 to 15 percent cobbles; 5 to 15 percent pebbles

*Moist bulk density:* 0.85 to 1.0 g/cm³

*Reaction:* pH 5.6 to 6.5

**2E horizon**

*Value:* 7 or 8 dry; 5 or 6 moist

*Chroma:* 2 or 3

*Texture:* Loam, silt loam, or fine sandy loam

*Clay content:* 12 to 20 percent
Content of rock fragments: 35 to 60 percent—trace stones; 20 to 30 percent cobbles; 15 to 30 percent pebbles
Reaction: pH 5.1 to 6.0

2Bt/E horizon
Value: B part: 6 or 7 dry, 4 or 5 moist; E part: 7 or 8 dry, 5 or 6 moist
Chroma: B part: 4 or 6; E part: 2 or 3
Texture: Loam, clay loam, or sandy clay loam
Clay content: 18 to 27 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 25 percent pebbles
Reaction: pH 5.1 to 6.0

96D—Courvash cobbly silt loam,
4 to 15 percent slopes

Setting
Landform: Moraines
Slope: 4 to 15 percent
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Courvash and similar soils: 90 percent

Minor Components
Slopes greater than 15 percent: 0 to 4 percent
Dewberry gravelly silt loam: 0 to 3 percent
Courville gravelly silt loam: 0 to 3 percent

Major Component Description
Surface layer texture: Cobbly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 8.2 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.

Courville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Moraines and mountains
Parent material: Volcanic ash over glacial till or glacial drift
Slope range: 2 to 60 percent
Elevation: 3,600 to 5,500 feet
Annual precipitation: 24 to 34 inches
Annual air temperature: 38 to 43 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

Typical Pedon

Courville gravelly silt loam, 8 to 30 percent slopes, in an area of forestland, 1,600 feet north and 2,500 feet west of the southeast corner of sec. 8, T. 17 N., R. 22 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
Bw—0 to 8 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium and few coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; clear wavy boundary.
2E—8 to 32 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 10 percent cobbles and 30 percent pebbles; neutral; gradual smooth boundary.
2E/Bw—32 to 60 inches; E part (70 percent) is very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; B part (30 percent) is pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; 15 percent cobbles and 35 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the volcanic ash-influenced layer: 7 to 14 inches
Bw horizon
Clay content: 7 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles
Moist bulk density: 0.85 to 1.0 g/cm³
Reaction: pH 5.6 to 6.5

2E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 5 to 18 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent stones and cobbles; 25 to 40 percent pebbles
Reaction: pH 6.1 to 7.3

2E/Bw horizon
Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, fine sandy loam, or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent stones and cobbles; 30 to 45 percent pebbles
Reaction: pH 6.1 to 7.3

22C—Courville gravelly silt loam,
2 to 8 percent slopes

Setting

Landform: Moraines
Slope: 2 to 8 percent
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Courville and similar soils: 90 percent

Minor Components
Slopes greater than 8 percent: 0 to 5 percent
Waldbillig gravelly silt loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

35E—Courville gravelly silt loam, 8 to 30 percent slopes

Setting

Landform: Moraines
Slope: 8 to 30 percent
Elevation: 3,900 to 5,500 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Courville and similar soils: 90 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Waldbillig gravelly silt loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

35F—Courville gravelly silt loam, 30 to 50 percent slopes

Setting

Landform: Moraines
Slope: 30 to 50 percent
Elevation: 3,900 to 5,500 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Courville and similar soils: 90 percent

Minor Components
Waldbillig gravelly silt loam: 0 to 5 percent
Slopes greater than 50 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

221F—Courville-Rockhill-Rock outcrop complex, 30 to 50 percent slopes

Setting

Landform:
• Courville—Mountains
• Rockhill—Mountains
Slope:
• Courville—30 to 50 percent
• Rockhill—30 to 60 percent
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 24 to 32 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Courville and similar soils: 45 percent
Rockhill and similar soils: 25 percent
Rock outcrop: 15 percent

Minor Components
Mitten gravelly silt loam: 0 to 10 percent
Rubble land: 0 to 5 percent
Major Component Description

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.5 inches

Rockhill
Surface layer texture: Very gravelly silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.7 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

Crystalex Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Stream terraces and outwash plains
Parent material: Wind-modified alluvium
Slope range: 0 to 60 percent
Elevation range: 3,300 to 3,800 feet
Annual precipitation: 24 to 30 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Lamellic Hapludalfs

Typical Pedon
Crystalex loamy coarse sand, in an area of Tamarack-Crystalex complex, 4 to 15 percent slopes, in an area of forestland, 300 feet north and 1,600 feet east of the southwest corner of sec. 19, T. 27 N., R. 27 W.

Oi—1 to 0 inches; undecomposed and slightly decomposed forest litter.
E1—0 to 9 inches; brown (10YR 5/3) loamy coarse sand, very pale brown (10YR 7/3) dry; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; slightly acid; gradual wavy boundary.
E2—9 to 21 inches; grayish brown (2.5Y 5/2) loamy coarse sand, light gray (2.5Y 7/2) dry; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; slightly acid; gradual wavy boundary.

E and Bt1—21 to 37 inches; E part (80 percent) is grayish brown (2.5Y 5/2) loamy sand, light gray (2.5Y 7/2) dry; B part (20 percent) is dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry, broken discontinuous lamellae 1/8- to 1/2-inch thick; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine and medium and few coarse roots; few faint clay films on faces of peds; moderately acid; gradual wavy boundary.

E and Bt2—37 to 60 inches; E part (60 percent) is grayish brown (2.5Y 5/2) loamy sand, light gray (2.5Y 7/2) dry; B part (40 percent) is dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry, broken discontinuous lamellae 3/8- to 1/2-inch thick; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common medium and few coarse roots; common faint clay films on faces of peds; slightly acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches

E horizons
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 0 to 5 percent
Reaction: pH 5.6 to 7.3

E and Bt horizons
Hue: 10YR or 2.5Y
Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Clay content: E part: 0 to 5 percent; B part: 5 to 10 percent
Reaction: pH 5.6 to 7.3

DA—Denied access

Composition

Major Components
Denied access: 100 percent

Major Component Description

Definition: Areas where mapping access permission was denied by the landowner

DAM—Dam

Composition

Major Components
Dam: 100 percent

Major Component Description

Definition: A barrier built to hold back flowing water.

Dewberry Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Volcanic ash over alluvium
Slope range: 2 to 45 percent
Elevation range: 2,200 to 2,600 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Ashy over loamy-skeletal, amorphic over mixed, superactive, frigid Typic Udivitrands

Typical Pedon

Dewberry silt loam, 2 to 8 percent slopes, in an area of forestland, 400 feet south and 2,300 feet west of the northeast corner of sec. 29, T. 26 N., R. 32 W.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; 10 percent pebbles; slightly acid; abrupt wavy boundary.

Bw1—1 to 9 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; 10 percent pebbles; moderately acid; gradual wavy boundary.
Bw2—9 to 23 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent cobbles and 20 percent pebbles; moderately acid; gradual wavy boundary.

2C1—23 to 38 inches; brown (10YR 5/3) extremely cobbly coarse sandy loam, very pale brown (10YR 7/3) dry; massive; loose, nonsticky, nonplastic; common fine and medium and few coarse roots; 30 percent cobbles and 40 percent pebbles; moderately acid; gradual wavy boundary.

2C2—38 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly sandy loam, light gray (10YR 7/2) dry; massive; loose, nonsticky, nonplastic; common medium and few coarse roots; 20 percent cobbles and 50 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Volcanic glass content in the 0.02 to 2.0 mm fraction: 12 to 20 percent
Acid oxalate extractable Al + 1/2 Fe: 1.60 to 2.25 percent
Phosphate retention: 25 to 75 percent
15-bar water retention on air-dried samples: 8 to 12 percent

A horizon
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2, 3, or 4
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles
Reaction: pH 5.1 to 6.5

Bw1 horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 3, 4, or 6
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles
Reaction: pH 5.1 to 6.5

Bw2 horizon
Hue: 7.5YR or 10YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3, 4, or 6
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles
Reaction: pH 5.1 to 6.5

88C—Dewberry silt loam, 2 to 8 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 2 to 8 percent
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Dewberry and similar soils: 90 percent

Minor Components
Glaciercreek: 0 to 5 percent
Tamarack moist: 0 to 3 percent
Slopes greater than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

88E—Dewberry gravelly silt loam, 8 to 45 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 8 to 45 percent
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 28 to 34 inches

Composition

Major Components
Dewberry and similar soils: 90 percent

Minor Components
Glacier creek: 0 to 6 percent
Dewberry cobbly silt loam: 0 to 3 percent
Slopes greater than 45 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

Doglake Series

Depth class: Very deep
Drainage class: Excessively drained

Permeability: Moderately rapid to 2C horizon; very rapid below this depth
Landform: Giant ripple marks
Parent material: Alluvium
Slope range: 2 to 12 percent
Elevation: 3,400 to 3,700 feet
Annual precipitation: 19 to 21 inches
Annual air temperature: 40 to 42 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal over fragmental, mixed, superactive, frigid Typic Haplustepts

Typical Pedon

Doglake extremely cobbly loam, 2 to 12 percent slopes, in an area of forestland, 2,300 feet south and 2,850 feet east of the northwest corner of sec. 4, T. 20 N., R. 25 W.

A—0 to 4 inches; brown (10YR 5/3) extremely cobbly loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, slightly sticky, nonplastic; many fine and few medium roots; 50 percent cobbles and 30 percent pebbles; slightly acid; clear smooth boundary.
Bw1—4 to 12 inches; pale brown (10YR 6/3) extremely cobbly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few very fine and fine roots; few fine pores; 55 percent cobbles and 30 percent pebbles; neutral; gradual wavy boundary.
Bw2—12 to 22 inches; pale brown (10YR 6/3) extremely cobbly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common fine roots; few fine pores; 55 percent cobbles and 30 percent pebbles; neutral; gradual wavy boundary.
2C—22 to 60 inches; 60 percent cobbles and 35 percent pebbles.

Range in Characteristics

Soil temperature: 41 to 43 degrees F
Depth to the fragmental material: 20 to 36 inches
Note: When mixed to 7 inches, the surface layer fails to meet the requirements of a mollic epipedon.

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 60 to 85 percent—
35 to 50 percent cobbles; 25 to 35 percent pebbles
Reaction: pH 6.1 to 7.3

Bw1 horizon
Value: 6 or 7 dry; 5 or 6 moist
Clay content: 10 to 18 percent
Content of rock fragments: 70 to 90 percent—
50 to 60 percent cobbles; 20 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

Bw2 horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 70 to 90 percent—
50 to 60 percent cobbles; 20 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

2C horizon
Content of rock fragments: 95 to 100 percent—
60 to 70 percent cobbles; 35 to 40 percent pebbles

98C—Doglake extremely cobbly loam,
2 to 12 percent slopes

Setting
Landform: Giant ripple marks
Slope: 2 to 12 percent
Elevation: 3,400 to 3,700 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Doglake and similar soils: 90 percent

Minor Components
Slopes greater than 12 percent: 0 to 5 percent
Doglake, very stony: 0 to 5 percent

Major Component Description
Surface layer texture: Extremely cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 0.9 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.

Dryfork Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 0 to 15 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Coarse-silty, mixed, active, frigid Calcic Haploxerepts

Typical Pedon

Dryfork silt loam, in an area of Dryfork-Kerrdam silt loams, 4 to 15 percent slopes, in an area of rangeland, 1,900 feet south and 500 feet east of the northwest corner of sec. 26, T. 23 N., R. 24 W.

A—0 to 6 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; soft, friable, slightly sticky, nonplastic; many fine and few coarse roots; neutral; clear smooth boundary.

Bw—6 to 16 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; strong medium subangular blocky structure; very hard, friable, slightly sticky, slightly plastic; common fine roots; moderately alkaline; clear smooth boundary.

Bk1—16 to 23 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; moderate medium subangular blocky structure; hard, friable, nonsticky, nonplastic; few fine roots; disseminated lime; few fine masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Bk2—23 to 31 inches; light gray (2.5Y 7/2) silt loam, pale yellow (2.5Y 7/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; disseminated lime; few fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.
C—31 to 60 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; soft, very friable, nonsticky, nonplastic; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 11 to 20 inches

A horizon
   Hue: 10YR or 2.5Y
   Value: 5 or 6 dry; 4 or 5 moist
   Chroma: 2, 3, or 4
   Clay content: 10 to 15 percent
   Electrical conductivity (mmhos/cm): 0 to 2
   Sodium adsorption ratio: 4 to 13
   Reaction: pH 6.6 to 7.3

Bw horizon
   Hue: 10YR or 2.5Y
   Value: 6, 7, or 8 dry; 4, 5, or 6 moist
   Chroma: 2, 3, or 4
   Clay content: 10 to 18 percent
   Electrical conductivity (mmhos/cm): 2 to 4
   Sodium adsorption ratio: 13 to 40
   Reaction: pH 7.9 to 9.0

Bk horizons
   Hue: 2.5Y or 10YR
   Value: 6, 7, or 8 dry; 5, 6, or 7 moist
   Chroma: 2, 3, or 4 moist
   Clay content: 5 to 18 percent
   Calcium carbonate equivalent: 5 to 15 percent
   Electrical conductivity (mmhos/cm): 2 to 4
   Sodium adsorption ratio: 13 to 40
   Reaction: pH 7.9 to 9.0

C horizon
   Hue: 5Y, 2.5Y, or 10YR
   Value: 6, 7, or 8 dry; 5, 6, or 7 moist
   Texture: Silt loam or very fine sandy loam
   Clay content: 5 to 18 percent
   Calcium carbonate equivalent: 5 to 10 percent
   Electrical conductivity (mmhos/cm): 0 to 4
   Sodium adsorption ratio: 4 to 30
   Reaction: pH 7.9 to 9.0

18B—Dryfork silt loam, 0 to 4 percent slopes

Setting

Landform: Lake plains or terraces
Slope: 0 to 4 percent

Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Dryfork and similar soils: 45 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

118B—Dryfork-Selow silt loams, 0 to 4 percent slopes

Setting

Landform:
• Dryfork—Lake plains or terraces
• Selow—Lake plains or terraces
Slope:
• Dryfork—0 to 4 percent
• Selow—0 to 4 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Dryfork and similar soils: 45 percent
Selow and similar soils: 40 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent
Major Component Description

Dryfork
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 10.3 inches

Selow
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 9.4 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.

118D—Dryfork-Kerrdam silt loams, 4 to 15 percent slopes

Setting

Landform:
• Dryfork—Lake plains or terraces
• Kerrdam—Lake plains or terraces
Slope:
• Dryfork—4 to 15 percent
• Kerrdam—4 to 15 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Dryfork and similar soils: 45 percent
Kerrdam and similar soils: 40 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Kerrdam
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Eolian deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 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.

218D—Dryfork-Selow silt loams, 4 to 15 percent slopes

Setting

Landform:
• Dryfork—Lake plains or terraces
• Selow—Lake plains or terraces
Slope:
• Dryfork—4 to 15 percent
• Selow—4 to 15 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Dryfork and similar soils: 45 percent
Selow and similar soils: 40 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent
**Major Component Description**

**Dryfork**
- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Lacustrine deposits
- **Native plant cover type:** Rangeland
- **Flooding:** None
- **Sodium affected:** Sodic within 30 inches
- **Available water capacity:** Mainly 10.3 inches

**Selow**
- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Lacustrine deposits
- **Native plant cover type:** Rangeland
- **Flooding:** None
- **Sodium affected:** Sodic within 30 inches
- **Available water capacity:** Mainly 9.4 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.

**Dubay Series**

- **Depth class:** Very deep
- **Drainage class:** Well drained
- **Permeability:** Moderately slow
- **Landform:** Stream terraces
- **Parent material:** Alluvium
- **Slope range:** 0 to 30 percent
- **Elevation range:** 2,300 to 2,800 feet
- **Annual precipitation:** 17 to 19 inches
- **Annual air temperature:** 42 to 45 degrees F
- **Frost-free period:** 105 to 125 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Lamellic Haploxerepts

**Typical Pedon**

Dubay silt loam, 0 to 4 percent slopes, in an area of forestland, 500 feet south and 1,550 feet east of the northwest corner of sec. 5, T. 20 N., R. 27 W.

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

A—0 to 3 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak coarse granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; moderately acid; abrupt smooth boundary.

E—3 to 8 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; strongly acid; clear smooth boundary.

E and Bw—8 to 40 inches; E part (80 percent) is pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; B part (20 percent) is brown (10YR 5/3) 1/8- to 1/2-inch thick silt loam lamellae, dark brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine, fine, medium, and coarse roots; moderately acid; gradual wavy boundary.

C—40 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky, slightly plastic; few very fine and fine roots; moderately acid.

**Range in Characteristics**

**Soil temperature:** 42 to 47 degrees F

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

**A horizon**
- **Value:** 4 or 5 dry; 2 or 3 moist
- **Chroma:** 1 or 2
- **Clay content:** 10 to 18 percent
- **Reaction:** pH 5.6 to 7.3

**E horizon**
- **Value:** 5, 6, or 7 dry; 4 or 5 moist
- **Chroma:** 2 or 3
- **Clay content:** 5 to 15 percent
- **Reaction:** pH 5.1 to 7.3

**E and Bw horizon**
- **Value:** E part: 6 or 7 dry, 4, 5, or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
- **Chroma:** E part: 2 or 3; B part: 2, 3, or 4
- **Clay content:** 5 to 15 percent
- **Reaction:** pH 5.6 to 7.3

**C horizon**
- **Value:** 5 or 6 dry; 4 or 5 moist
- **Chroma:** 2, 3, or 4
- **Clay content:** 5 to 15 percent
- **Reaction:** pH 5.6 to 7.8
24B—Dubay silt loam, 0 to 4 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Dubay and similar soils: 90 percent
Minor Components
Selon fine sandy loam, moist: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt 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 11.1 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.

24D—Dubay silt loam, 4 to 15 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,300 to 2,500 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Dubay and similar soils: 90 percent
Minor Components
Selon fine sandy loam, moist: 0 to 4 percent
Slopes greater than 15 percent: 0 to 4 percent
Aeric Haplaquepts: 0 to 2 percent

Major Component Description
Surface layer texture: Silt 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 11.1 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.

824E—Dubay silt loam, 15 to 30 percent slopes

Setting
Landform: Stream terraces
Position on landform: Dissected or incised treads
Slope: 15 to 30 percent
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Dubay and similar soils: 90 percent
Minor Components
Selon fine sandy loam, moist: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt 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 11.1 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.

**Eaglewing Series**

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Mountains
**Parent material:** Colluvium from argillite or quartzite
**Slope range:** 8 to 50 percent
**Elevation:** 3,400 to 5,200 feet
**Annual precipitation:** 19 to 22 inches
**Annual air temperature:** 40 to 45 degrees F
**Frost-free period:** 70 to 90 days

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

**Typical Pedon**

Eaglewing gravelly loam, 30 to 50 percent slopes, in an area of forestland, 1,700 feet south and 1,050 feet west of the northeast corner of sec. 2, T. 16 N., R. 21 W.

Oi—1 inch to 0; partially decomposed forest litter.
E—0 to 7 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine, common medium, and few coarse roots; 20 percent pebbles; neutral; clear smooth boundary.
E/Bw—7 to 16 inches; E part (75 percent) is light yellowish brown (2.5Y 6/4) gravelly loam, light olive brown (2.5Y 5/4) moist; B part (25 percent) is light olive brown (2.5Y 5/4) gravelly loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and few medium and coarse roots; 25 percent pebbles; neutral; clear smooth boundary.

Bk1—16 to 28 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and few medium roots; 25 percent pebbles; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—28 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, slightly sticky, slightly plastic; few fine and medium roots; 10 percent cobbles and 30 percent pebbles; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature:** 42 to 47 degrees F
**Moisture control section:** Between 4 and 12 inches
**Depth to the Bk horizon:** 13 to 20 inches

**E horizon**
- Clay content: 18 to 27 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles
- Reaction: pH 6.6 to 7.3

**E/Bw horizon**
- Hue: 10YR or 2.5Y
- Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4
- Texture: Silt loam or loam
- Clay content: 18 to 27 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles
- Reaction: pH 6.6 to 7.3

**Bk1 horizon**
- Value: 7 or 8 dry; 5, 6, or 7 moist
- Chroma: 2 or 3
- Texture: Silt loam or loam
- Clay content: 18 to 27 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles
- Calcium carbonate equivalent: 20 to 40 percent
- Reaction: pH 7.9 to 8.4

**Bk2 horizon**
- Value: 6, 7, or 8 dry; 5, 6, or 7 moist
- Chroma: 2 or 3
- Texture: Silt loam or loam
Clay content: 15 to 27 percent
Content of rock fragments: 5 to 45 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 30 percent pebbles
Calcium carbonate equivalent: 20 to 40 percent
Reaction: pH 7.9 to 9.0

28E—Eaglewing gravelly loam, 8 to 30 percent slopes

Setting
Landform: Mountains
Slope: 8 to 30 percent
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 19 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Eaglewing and similar soils: 90 percent
Minor Components
Repp gravelly loam: 0 to 5 percent
Slopes greater than 50 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: Calcareous argillite or quartzite 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.

28F—Eaglewing gravelly loam, 30 to 50 percent slopes

Setting
Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,400 to 5,200 feet
Mean annual precipitation: 19 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Eaglewing and similar soils: 90 percent
Minor Components
Repp gravelly loam: 0 to 5 percent
Slopes greater than 50 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: Calcareous argillite or quartzite 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.

Elkrock Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 60 percent
Elevation range: 2,400 to 2,900 feet
Annual precipitation: 17 to 24 inches
Annual air temperature: 43 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Vitrandic Haploxerepts

Typical Pedon
Elkrock cobbly silt loam, 2 to 6 percent slopes, in an area of forestland, 1,500 feet south and 2,400 feet west of the northeast corner of sec. 17, T. 20 N., R. 26 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 2 inches; very dark gray (10YR 3/1) cobbly silt loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and common coarse roots; 15 percent cobbles and 10 percent pebbles; slightly acid; clear wavy boundary.

Bw—2 to 13 inches; brown (10YR 5/3) very gravelly silt loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and common coarse roots; 15 percent cobbles and 35 percent pebbles; moderately acid; clear wavy boundary.

2C—13 to 60 inches; pale brown (10YR 6/3) extremely cobbly loam, very pale brown (10YR 7/3) dry; massive; soft, very friable, slightly sticky, slightly plastic; few very fine, fine, medium, and coarse roots; 40 percent cobbles and 30 percent pebbles; moderately acid (pH 5.8).

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between 8 and 24 inches

A horizon
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Clay content: 7 to 20 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 10 to 15 percent pebbles
Moist bulk density: 1.05 to 1.30 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Reaction: pH 6.1 to 7.3

Bw horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Texture: Loam, silt loam, or sandy loam
Clay content: 7 to 20 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent pebbles
Moist bulk density: 1.00 to 1.30 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.2 percent
Reaction: pH 5.6 to 7.3

2C horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 7 to 20 percent

47C—Elkrock cobbly silt loam, 2 to 6 percent slopes, stony

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 2 to 6 percent
Elevation: 2,400 to 2,800 feet

Composition

Major Components
Elkrock and similar soils: 90 percent

Minor Components
Elkrock, bouldery: 0 to 5 percent
Slopes greater than 6 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 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.

47D—Elkrock gravelly silt loam, 4 to 15 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 105 to 125 days

**Composition**

**Major Components**
Elkrock and similar soils: 90 percent

**Minor Components**
Slopes greater than 15 percent: 0 to 5 percent
Elkrock stony silt loam: 0 to 5 percent

**Major Component Description**
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 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.

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472B—Elkrock gravelly silt loam, moist, 0 to 4 percent slopes

**Setting**
Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 105 to 125 days

**Composition**

**Major Components**
Elkrock and similar soils: 90 percent

**Minor Components**
Elkrock stony silt loam, moist: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

**Major Component Description**
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 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.
472D—Elkrock gravelly silt loam, moist, 4 to 15 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,400 to 2,900 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Elkrock and similar soils: 90 percent

Minor Components
Elkrock stony silt loam, moist: 0 to 4 percent
Slopes greater than 15 percent: 0 to 4 percent
Sacheen loamy fine sand: 0 to 2 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 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.

472F—Elkrock gravelly silt loam, moist, 30 to 60 percent slopes

Setting

Landform: Stream terraces
Position on landform: Risers
Slope: 30 to 60 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Elkrock and similar soils: 90 percent

Minor Components
Slopes greater than 60 percent: 0 to 5 percent
Elkrock stony silt loam, moist: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 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.

473D—Elkrock-Selon complex, 4 to 15 percent slopes

Setting

Landform:
• Elkrock—Stream terraces
• Selon—Stream terraces
Position on landform:
• Elkrock—Treads
• Selon—Treads
Slope:
• Elkrock—4 to 15 percent
• Selon—4 to 15 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Elkrock and similar soils: 50 percent
Selon and similar soils: 35 percent

Minor Components
Elkrock stony silt loam, moist: 0 to 5 percent
Slopes greater than 15 percent: 0 to 4 percent
Bemishave loam: 0 to 3 percent
Sacheen loamy fine sand: 0 to 3 percent

Major Component Description

Elkrock
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 inches

Selon
Surface layer texture: Fine 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 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.

Felan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Volcanic ash over colluvium
Slope range: 15 to 60 percent
Elevation: 3,600 to 6,200 feet
Annual precipitation: 30 to 50 inches
Annual air temperature: 37 to 42 degrees F
Frost-free period: 30 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Haplocryalfs

Typical Pedon

Felan gravelly silt loam, 35 to 60 percent slopes, in an area of forestland, 400 feet north and 2,400 feet west of the southeast corner of sec. 15, T. 16 N., R. 21 W.

Oi—2 inches to 0; partially decomposed forest litter.
Bw—0 to 8 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; 40 percent pebbles; neutral; gradual wavy boundary.

2E—8 to 20 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 30 percent pebbles; slightly acid; clear smooth boundary.

2Bt—20 to 45 inches; light yellowish brown (2.5Y 6/4) extremely gravelly loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine, fine, and medium roots; common faint clay bridging of sand grains; 10 percent cobbles and 60 percent pebbles; neutral; gradual wavy boundary.

2Bk—45 to 60 inches; white (2.5Y 8/2) extremely gravelly loam, light gray (2.5Y 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; 10 percent cobbles and 60 percent pebbles; disseminated lime; few fine masses of lime; very slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the volcanic ash-influenced layer: Between 7 and 10 inches
Depth to the Bk horizon: 40 to 60 inches

Bw horizon

Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Clay content: 5 to 20 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles
Moist bulk density: 1.0 g/cm³ or less
Reaction: pH 5.1 to 6.5

2E horizon

Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 35 to 70 percent—0 to 10 percent cobbles, 35 to 60 percent pebbles
Moist bulk density: 1.0 g/cm³ or less
Reaction: pH 6.6 to 7.8

2Bt horizon

Hue: 2.5Y or 10YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 70 percent—0 to 10 percent cobbles, 35 to 60 percent pebbles
Reaction: pH 5.1 to 7.3

2Bk horizon

Hue: 2.5Y or 10YR
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 2 or 3  
Clay content: 10 to 20 percent  
Content of rock fragments: 40 to 70 percent—0 to 10 percent stones and cobbles; 40 to 60 percent pebbles  
Calcium carbonate equivalent: 5 to 10 percent  
Reaction: pH 7.4 to 8.4

46F—Felan gravelly silt loam,  
35 to 60 percent slopes

Setting
Landform: Mountains  
Slope: 35 to 60 percent  
Elevation: 5,000 to 6,200 feet  
Mean annual precipitation: 36 to 45 inches  
Frost-free period: 40 to 60 days

Composition
Major Components  
Felan and similar soils: 85 percent  
Minor Components  
Slopes greater than 60 percent: 0 to 5 percent  
Areas of rock outcrop: 0 to 3 percent  
Holloway gravelly silt loam: 0 to 3 percent

Major Component Description
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained  
Dominant parent material: Volcanic ash over colluvium  
Native plant cover type: Forestland  
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.

76F—Felan gravelly silt loam, moist,  
35 to 60 percent slopes

Setting
Landform: Mountains  
Slope: 35 to 60 percent  
Elevation: 3,600 to 5,600 feet  
Mean annual precipitation: 30 to 50 inches  
Frost-free period: 30 to 70 days

Composition
Major Components  
Felan and similar soils: 90 percent  
Minor Components  
Slopes greater than 35 percent: 0 to 4 percent  
Areas of rock outcrop: 0 to 3 percent  
Holloway gravelly silt loam: 0 to 3 percent

Major Component Description
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained  
Dominant parent material: Volcanic ash over colluvium  
Native plant cover type: Forestland  
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.

76E—Felan gravelly silt loam, moist,  
15 to 35 percent slopes

Setting
Landform: Mountains  
Slope: 15 to 35 percent  
Elevation: 3,600 to 5,600 feet  
Mean annual precipitation: 30 to 50 inches  
Frost-free period: 30 to 70 days

Composition
Major Components  
Felan and similar soils: 90 percent  
Minor Components  
Upsata gravelly silt loam: 0 to 4 percent  
Areas of rock outcrop: 0 to 3 percent  
Holloway gravelly silt loam: 0 to 3 percent

Major Component Description
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
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.

Fernline Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Lake plains or terraces
Parent material: Volcanic ash over glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation range: 2,200 to 2,800 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Fine, mixed, active, frigid Andic Hapludalfs

Typical Pedon
Fernline silt loam, 0 to 4 percent slopes, in an area of forestland, 1,900 feet north and 500 feet west of the southeast corner of sec. 33, T. 26 N., R. 32 W.
Oi—2 to 0 inches; undecomposed and slightly decomposed forest litter.
A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; moderately acid; clear wavy boundary.
Bw—1 to 9 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; moderately acid; clear wavy boundary.
2E—9 to 14 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; moderately acid; gradual wavy boundary.
2Bt/E—14 to 21 inches; B part (60 percent) is brown (7.5YR 5/4) silty clay, pink (7.5YR 7/4) dry; E part (40 percent) is brown (10YR 5/3) silty clay, very pale brown (10YR 7/3) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.
2Bt—21 to 34 inches; brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) silty clay, pink (7.5YR 7/4) and pinkish white (7.5YR 8/2) dry; strong medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.
2C—34 to 60 inches; brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) silty clay, pink (7.5YR 7/4) and pinkish white (7.5YR 8/2) dry; massive; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; few fine distinct mottles; neutral.

Range in Characteristics
Soil temperature: 44 to 47 degrees F
Moisture control section: Between 4 and 12 inches

A horizon
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Clay content: 8 to 15 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1.0 to 2.1 percent
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: 8 to 15 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Reaction: pH 5.6 to 6.5

2E horizon
Value: 6, 7, or 8 dry; 5, 6, or 7 moist
Clay content: 27 to 35 percent
Reaction: pH 5.1 to 6.5

2Bt/E horizon
Hue: 7.5YR or 10YR
Value: B part: 6 or 7 dry, 4 or 5 moist; E part: 6 or 7 dry, 5 or 6 moist
Chroma: E part: 2 or 3
Clay content: 40 to 50 percent
Reaction: pH 5.1 to 6.5

2B horizon
Hue: 10YR, 7.5YR, or 5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: 40 to 60 percent
Reaction: pH 5.1 to 6.5

2C horizon
Hue: 10YR, 7.5YR, or 5YR
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Clay content: 40 to 60 percent
Reaction: pH 5.1 to 7.3

78B—Fernline silt loam, 0 to 4 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,200 to 2,700 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Fernline and similar soils: 90 percent

Minor Components
Noxlin silt loam: 0 to 4 percent
Slopes greater than 4 percent: 0 to 3 percent
Iffgulch and similar soils: 0 to 3 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

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

78D—Fernline silt loam, 4 to 15 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,200 to 2,700 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Fernline and similar soils: 90 percent

Minor Components
Iffgulch and similar soils: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

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

781D—Fernline-Cabinet silt loams, 4 to 15 percent slopes

Setting
Landform:
• Fernline—Lake plains or terraces
• Cabinet—Lake plains or terraces
Position on landform:
• Fernline—Treads
• Cabinet—Treads
Slope:
• Fernline—4 to 15 percent
• Cabinet—4 to 15 percent
Elevation: 2,200 to 2,700 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Fernline and similar soils: 50 percent
Cabinet and similar soils: 40 percent

Minor Components
Iffgulch and similar soils: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description

Fernline
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

Cabinet
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Water table: Perched
Available water capacity: Mainly 10.2 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.

781E—Fernline-Cabinet silt loams, 15 to 30 percent slopes

Setting

Landform:
- Fernline—Lake plains or terraces
- Cabinet—Lake plains or terraces

Position on landform:
- Fernline—Dissected or incised treads
- Cabinet—Dissected or incised treads

Slope:
- Fernline—15 to 30 percent
- Cabinet—15 to 30 percent

Elevation: 2,200 to 2,700 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Fernline and similar soils: 50 percent
Cabinet and similar soils: 40 percent

Minor Components
Iffgulch and similar soils: 0 to 5 percent
Noxlin silt loam: 0 to 3 percent
Slopes greater than 30 percent: 0 to 2 percent

Major Component Description

Fernline
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches

Cabinet
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Water table: Perched
Available water capacity: Mainly 10.2 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.

Finleypoint Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Hills
Parent material: Colluvium
Slope range: 15 to 60 percent  
Elevation: 3,000 to 4,900 feet  
Annual precipitation: 18 to 21 inches  
Annual air temperature: 41 to 45 degrees F  
Frost-free period: 90 to 105 days  

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls  

Typical Pedon  
Finleypoint gravelly loam, 15 to 30 percent slopes, in an area of forestland, 200 feet south and 2,000 feet east of the northwest corner of sec. 13, T. 18 N., R. 21 W.  
Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.  
A1—0 to 8 inches; very dark gray (10YR 3/1) gravelly loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; 10 percent cobbles and 15 percent pebbles; slightly acid; clear wavy boundary.  
A2—8 to 16 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; 25 percent cobbles and 20 percent pebbles; slightly acid; clear wavy boundary.  
E—16 to 38 inches; white (10YR 8/2) very cobbly sandy loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots; 20 percent cobbles and 30 percent pebbles; slightly acid; gradual wavy boundary.  
E/Bw—38 to 60 inches; E part (70 percent) is light gray (10YR 7/1) very cobbly sandy loam, gray (10YR 6/1) moist; B part (30 percent) is light brownish gray (10YR 6/2) very cobbly sandy loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; 25 percent cobbles and 30 percent pebbles; neutral.  

Range in Characteristics  
Soil temperature: 43 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Thickness of the mollic epipedon: 10 to 16 inches  
Note: Some pedons have a Bw/E horizon in place of the E/Bw horizon.  

54E—Finleypoint gravelly loam, 15 to 30 percent slopes  

Setting  
Landform: Hills  
Slope: 15 to 30 percent  
Elevation: 3,000 to 4,800 feet  
Mean annual precipitation: 18 to 20 inches  
Frost-free period: 90 to 105 days  

Composition  
Major Components  
Finleypoint and similar soils: 90 percent
Minor Components
Slopes greater than 30 percent: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Bigarm gravelly loam: 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 5.8 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.

64E—Finleypoint gravelly loam, moist, 15 to 30 percent slopes

Setting
Landform: Hills
Slope: 15 to 30 percent
Elevation: 3,200 to 4,900 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 90 to 100 days

Composition
Major Components
Finleypoint and similar soils: 85 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent
Bigarm gravelly loam: 0 to 5 percent
Slopes greater 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: Colluvium
Native plant cover type: Forestland
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.

64F—Finleypoint gravelly loam, moist, 30 to 60 percent slopes

Setting
Landform: Hills
Slope: 30 to 60 percent
Elevation: 3,200 to 4,900 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 90 to 100 days

Composition
Major Components
Finleypoint and similar soils: 85 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent
Bigarm gravelly loam: 0 to 5 percent
Slopes greater 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: 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.
### Composition

**Major Components**
Finleypoint and similar soils: 85 percent

**Minor Components**
Bigarm gravelly loam: 0 to 5 percent
Areas of rubble land: 0 to 5 percent
Slopes greater than 60 percent: 0 to 5 percent

**Major Component Description**

<table>
<thead>
<tr>
<th>Surface layer texture</th>
<th>Gravelly loam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth class</td>
<td>Very deep (more than 60 inches)</td>
</tr>
<tr>
<td>Drainage class</td>
<td>Well drained</td>
</tr>
<tr>
<td>Dominant parent material</td>
<td>Colluvium</td>
</tr>
<tr>
<td>Native plant cover type</td>
<td>Forestland</td>
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<tr>
<td>Flooding</td>
<td>None</td>
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<tr>
<td>Available water capacity</td>
<td>Mainly 6.0 inches</td>
</tr>
</tbody>
</table>

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

### Management

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

### 254F—Finleypoint-Rubble land complex, 30 to 60 percent slopes

**Setting**

- **Landform**: Hills
- **Slope**: 30 to 60 percent
- **Elevation**: 3,000 to 4,800 feet
- **Mean annual precipitation**: 18 to 20 inches
- **Frost-free period**: 90 to 105 days

**Composition**

**Major Components**
Finleypoint and similar soils: 55 percent
Rubble land: 30 percent

**Minor Components**
Hogsby cobbly loam: 0 to 5 percent
Bigarm gravelly loam: 0 to 5 percent
Slopes greater than 60 percent: 0 to 5 percent

**Major Component Description**

**Finleypoint**

<table>
<thead>
<tr>
<th>Surface layer texture</th>
<th>Cobbly loam</th>
</tr>
</thead>
<tbody>
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<td>Depth class</td>
<td>Very deep (more than 60 inches)</td>
</tr>
<tr>
<td>Drainage class</td>
<td>Well drained</td>
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<tr>
<td>Dominant parent material</td>
<td>Colluvium</td>
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<td>Native plant cover type</td>
<td>Forestland</td>
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<tr>
<td>Flooding</td>
<td>None</td>
</tr>
<tr>
<td>Available water capacity</td>
<td>Mainly 6.0 inches</td>
</tr>
</tbody>
</table>

**Rubble land**

**Definition**: Areas covered by boulders or stones that support 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.

### Firetower Series

**Depth class**: Very deep

**Drainage class**: Somewhat poorly drained

**Permeability**: Moderate

**Landform**: Low stream terraces

**Parent material**: Alluvium

**Slope range**: 0 to 2 percent

**Elevation range**: 3,300 to 3,800 feet

**Annual precipitation**: 24 to 30 inches

**Annual air temperature**: 42 to 45 degrees F

**Frost-free period**: 70 to 90 days

**Taxonomic Class**: Coarse-loamy, mixed, superactive, frigid Cumulic Hapludolls

**Typical Pedon**

Firetower silt loam, in an area of Meadowpeak-Firetower silt loams, 0 to 2 percent slopes, in an area of rangeland, 2,300 feet south and 2,100 feet east of the northwest corner of sec. 23, T. 27 N., R. 28 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; moderately acid; clear wavy boundary.

Bw1—6 to 17 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; slightly acid; gradual wavy boundary.

Bw2—17 to 29 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; slightly acid; gradual wavy boundary.
fine, fine, and medium roots; slightly acid; gradual wavy boundary.

Bw3—29 to 42 inches; grayish brown (10YR 5/2) loam, light brownish gray (10YR 6/2) dry; few fine faint redox concentrations in root channels; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; slightly acid; gradual wavy boundary.

C1—42 to 51 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (2.5Y 6/2) dry; common fine distinct brownish yellow (10YR 6/6) redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; common medium roots; neutral; gradual wavy boundary.

C2—51 to 60 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; common fine distinct brownish yellow (10YR 6/6) redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; neutral.

Range in Characteristics

**Soil temperature:** 44 to 47 degrees F  
**Moisture control section:** Between 8 and 24 inches  
**Thickness of the mollic epipedon:** 16 to 26 inches  
**Depth to the seasonal high water table:** 24 to 42 inches

**A horizon**  
Value: 4 or 5 dry  
Clay content: 5 to 18 percent  
Reaction: pH 5.6 to 7.3

**Bw1 horizon**  
Value: 4 or 5 dry  
Clay content: 5 to 18 percent  
Reaction: pH 5.6 to 7.3

**Bw2 and Bw3 horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Texture: Silt loam or loam  
Clay content: 5 to 18 percent  
Reaction: pH 5.6 to 7.3

**C horizons**  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Texture: Loam or silt loam  
Clay content: 5 to 18 percent  
Reaction: pH 6.1 to 7.3

**Flott Series**

Depth class: Very deep  
Drainage class: Well drained

**Permeability:** Moderate  
**Landform:** Hills  
**Parent material:** Colluvium and glacial drift  
**Slope range:** 15 to 50 percent  
**Elevation:** 2,900 to 4,400 feet  
**Annual precipitation:** 18 to 21 inches  
**Annual air temperature:** 40 to 44 degrees F  
**Frost-free period:** 90 to 105 days

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

**Typical Pedon**

Flott gravelly loam, 30 to 50 percent slopes, in an area of forestland, 250 feet north of the southeast corner of sec. 36, T. 17 N., R. 21 W.

Oi—3 inches to 0; partially decomposed forest litter.  
A1—0 to 10 inches; very dark gray (10YR 3/1) gravelly loam, black (10YR 2/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine and few fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

A2—10 to 16 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine and few fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; neutral; abrupt wavy boundary.

Bk—16 to 29 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine and few fine, medium, and coarse roots; 10 percent cobbles and 35 percent pebbles; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Ck—29 to 60 inches; light brownish gray (10YR 6/2) gravelly loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; few medium and coarse roots; 15 percent cobbles and 40 percent pebbles; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

**Soil temperature:** 42 to 47 degrees F  
**Moisture control section:** Between 4 and 12 inches  
**Thickness of the mollic epipedon:** 10 to 16 inches  
**Depth to the Bk horizon:** 15 to 30 inches
A horizons
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

Bk and Ck horizons
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 18 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent stones and cobbles; 35 to 45 percent pebbles
Calcium carbonate equivalent: 15 to 25 percent
Reaction: pH 7.9 to 8.4

61F—Flott gravelly loam, 30 to 50 percent slopes

Setting
Landform: Hills
Slope: 30 to 50 percent
Elevation: 3,000 to 4,400 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 90 to 100 days

Composition
Major Components
Flott and similar soils: 85 percent
Minor Components
Slopes greater than 50 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Finley point gravelly loam: 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: Colluvium or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.1 inches

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

62F—Flott gravelly loam, dry, 30 to 50 percent slopes

Setting
Landform: Hills
Slope: 30 to 50 percent
Elevation: 2,900 to 4,200 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Flott and similar soils: 85 percent
Minor Components
Bigarm gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Slopes greater than 50 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: Colluvium or glacial drift
Native plant cover type: Forestland
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.

Gardencreek Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,500 to 2,800 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 105 to 120 days

**Taxonomic Class:** Fine, mixed, superactive, nonacid, frigid Aquic Xerofluvents

**Typical Pedon**

Gardencreek silty clay loam, 0 to 2 percent slopes, in an area of cropland, 1,050 feet north and 900 feet east of the southwest corner of sec. 10, T. 21 N., R. 23 W.

Ap—0 to 8 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, firm, moderately sticky, slightly plastic; many fine and medium and few coarse roots; few very fine and fine tubular and interstitial pores; neutral; clear smooth boundary.

C1—8 to 21 inches; gray (5Y 6/1) silty clay loam, dark gray (5Y 4/1) moist; massive; hard, firm, moderately sticky, moderately plastic; many fine and medium and few coarse roots; many very fine and fine and few coarse roots; many very fine and fine tubular pores; slightly alkaline; abrupt smooth boundary.

C2—21 to 24 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; many fine and medium tubular pores; slightly alkaline; abrupt smooth boundary.

C3—24 to 43 inches; light gray (5Y 7/1) silty clay, gray (5Y 5/1) moist; massive; very hard, very firm, very sticky, very plastic; few fine and medium roots; many very fine and fine and few medium tubular pores; slightly alkaline; clear smooth boundary.

C4—43 to 60 inches; light gray (5Y 7/1) silty clay, gray (5Y 5/1) moist; common fine faint olive (5Y 5/4) redox concentrations; few very fine and fine tubular pores; massive; hard, firm, very sticky, moderately plastic; moderately alkaline.

**Range in Characteristics**

**Ap horizon**
- Hue: 10YR or 2.5Y
- Value: 4 or 5 moist; 5 or 6 dry
- Chroma: 1 or 2
- Clay content: 27 to 35 percent
- Calcium carbonate equivalent: 0 to 1 percent
- Sodium adsorption ratio: 1 to 5
- Reaction: pH 6.6 to 7.8

**C1 horizon**
- Hue: 10YR, 2.5Y, or 5Y
- Value: 4 or 5 moist; 5, 6, or 7 dry
- Chroma: 0 or 1
- Clay content: 30 to 40 percent
- Calcium carbonate equivalent: 0 to 1 percent
- Sodium adsorption ratio: 1 to 5
- Reaction: pH 6.6 to 7.8

**C2 horizon**
- Hue: 2.5Y or 5Y
- Value: 3, 4, or 5 moist; 5, 6, or 7 dry
- Chroma: 1 or 2
- Clay content: 30 to 40 percent
- Calcium carbonate equivalent: 0 to 1 percent
- Sodium adsorption ratio: 1 to 5
- Reaction: pH 6.6 to 7.8

**C3 horizon**
- Value: 4, 5, or 6 moist; 6, 7, or 8 dry
- Chroma: 0 or 1
- Texture: Silty clay or silty clay loam
- Clay content: 35 to 60 percent
- Calcium carbonate equivalent: 0 to 1 percent
- Sodium adsorption ratio: 5 to 10
- Reaction: pH 7.4 to 8.4

**C4 horizon**
- Value: 4, 5, or 6 moist; 6, 7, or 8 dry
- Chroma: 1 or 2
- Texture: Silty clay or silty clay loam
- Clay content: 35 to 60 percent
- Calcium carbonate equivalent: 0 to 1 percent
- Sodium adsorption ratio: 5 to 10
- Reaction: pH 7.4 to 8.4

**95A—Gardencreek silty clay loam, 0 to 2 percent slopes**

**Setting**

- Landform: Flood plains
- Slope: 0 to 2 percent
Elevation: 2,500 to 2,800 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 120 days

Composition

Major Components
Gardencreek and similar soils: 90 percent

Minor Components
Sonyok silty clay loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 10.4 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.

Gird Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation: 2,400 to 3,200 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Calcic Haploxerolls

Typical Pedon
Gird silt loam, 0 to 4 percent slopes, in an area of cropland, 1,790 feet north and 600 feet west of the southeast corner of sec. 18, T. 19 N., R. 25 W.
Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; neutral; abrupt smooth boundary.
Bw—9 to 16 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium roots; neutral; clear smooth boundary.
Bk—16 to 46 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.
C—46 to 60 inches; light yellowish brown (10YR 6/4) very fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 12 to 17 inches
Depth to the Bk horizon: 12 to 21 inches

Ap horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 4 or 5 dry; 3 or 4 moist
Clay content: 10 to 18 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

C horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Texture: Silt loam or very fine sandy loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 3 to 10 percent
Reaction: pH 7.4 to 8.4
3A—Gird silt loam, 0 to 4 percent slopes

**Setting**

*Landform:* Stream terraces  
*Position on landform:* Treads  
*Slope:* 0 to 4 percent  
*Elevation:* 2,400 to 3,200 feet  
*Mean annual precipitation:* 15 to 17 inches  
*Frost-free period:* 105 to 125 days

**Composition**

**Major Components**

Gird and similar soils: 85 percent

**Minor Components**

McCollum fine sandy loam: 0 to 8 percent  
Grantsdale silt loam: 0 to 5 percent  
Slopes greater than 4 percent: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt 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 10.4 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.

3B—Gird silt loam, 4 to 8 percent slopes

**Setting**

*Landform:* Stream terraces  
*Position on landform:* Treads  
*Slope:* 4 to 8 percent  
*Elevation:* 2,400 to 3,200 feet  
*Mean annual precipitation:* 15 to 17 inches  
*Frost-free period:* 105 to 125 days

**Composition**

**Major Components**

Gird and similar soils: 50 percent  
McCollum and similar soils: 40 percent

**Minor Components**

Grantsdale silt loam: 0 to 5 percent  
McCollum fine sandy loam: 0 to 5 percent  
Slopes greater than 8 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Silt 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 10.4 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.

103B—Gird-McCollum complex, 0 to 4 percent slopes

**Setting**

*Landform:*  
- Gird—Stream terraces  
- McCollum—Stream terraces  
*Position on landform:*  
- Gird—Treads  
- McCollum—Treads  
*Slope:*  
- Gird—0 to 4 percent  
- McCollum—0 to 4 percent  
*Elevation:* 2,400 to 3,000 feet  
*Mean annual precipitation:* 15 to 17 inches  
*Frost-free period:* 105 to 125 days

**Composition**

**Major Components**

Gird and similar soils: 85 percent  
McCollum and similar soils: 15 percent  
Grantsdale silt loam: 0 to 5 percent  
Slopes greater than 4 percent: 0 to 2 percent

**Minor Components**

McCollum fine sandy loam: 0 to 5 percent  
Grantsdale silt loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Silt 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 10.4 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.
Major Component Description

Gird
Surface layer texture: Silt 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 10.4 inches

McCollum
Surface layer texture: Fine 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 7.8 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.

261C—Gird-McCollum complex, 4 to 8 percent slopes

Setting

Landform:
• Gird—Stream terraces
• McCollum—Stream terraces

Position on landform:
• Gird—Treads
• McCollum—Treads

Slope:
• Gird—4 to 8 percent
• McCollum—4 to 8 percent

Elevation: 2,400 to 2,600 feet
Mean annual precipitation: 16 to 19 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Gird and similar soils: 45 percent
McCollum and similar soils: 40 percent

Minor Components
Grantsdale silt loam: 0 to 7 percent
Slopes greater than 8 percent: 0 to 5 percent
Sacheen loamy fine sand: 0 to 3 percent

Glaciercreek Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderate to 20 inches; very rapid below this depth

Landform: Alluvial fans, stream terraces, and outwash plains

Parent material: Volcanic ash over alluvium and glacial outwash

Slope range: 0 to 45 percent
Elevation range: 2,200 to 4,200 feet
Annual precipitation: 20 to 30 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Andic Eutrudepts

Typical Pedon

Glaciercreek gravelly silt loam, 2 to 8 percent slopes, in an area of forestland, 2,200 feet north and 2,100 feet west of the southeast corner of sec. 11, T. 26 N., R. 27 W.

Oi—1 to 0 inch; partially decomposed forest litter.
A—0 to 2 inches; brown (10YR 4/3) gravelly silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 15 percent pebbles; slightly acid; clear wavy boundary.

Bw—2 to 9 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 15 percent pebbles; moderately acid; clear wavy boundary.

2E/Bw—9 to 20 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 45 percent pebbles; moderately acid; gradual wavy boundary.

2C1—20 to 32 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky, nonplastic; common fine, medium, and coarse roots; 15 percent cobbles and 60 percent pebbles; moderately acid; gradual wavy boundary.

2C2—32 to 60 inches; very pale brown (10YR 7/3) extremely cobbly loamy sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky, nonplastic; common fine, medium, and coarse roots; 35 percent cobbles and 45 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 12 and 35 inches

A horizon
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 1, 2, or 3
- Clay content: 5 to 15 percent
- Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles
- Moist bulk density: Less than 0.95 g/cm³
- Reaction: pH 5.6 to 7.3

Bw horizon
- Value: 5, 6, or 7 dry; 4 or 5 moist
- Chroma: 3 or 4
- Clay content: 5 to 15 percent
- Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 3, 4, or 5 moist
- Chroma: 2, 3, or 4
- Clay content: 5 to 15 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 5.6 to 7.3

2E horizons
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 3, 4, 5, or 6 moist
- Chroma: 2, 3, or 4
- Clay content: 5 to 15 percent
- Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 30 to 45 percent pebbles

2C horizons
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 3, 4, 5, or 6 moist
- Chroma: 2, 3, or 4
- Clay content: 5 to 15 percent
- Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 35 percent cobbles; 45 to 60 percent pebbles

67A—Glaciercreek gravelly silt loam, cool, 0 to 2 percent slopes

Setting

Landform: Stream terraces and outwash plains
Position on landform: Treads
Slope: 0 to 2 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Glaciercreek and similar soils: 90 percent

Minor Components
Loonlake gravelly silt loam: 0 to 5 percent
Slopes greater than 2 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

**67C—Glaciercreek gravelly silt loam, cool, 2 to 8 percent slopes**

**Setting**
*Landform:* Stream terraces and outwash plains
*Position on landform:* Treads
*Slope:* 2 to 8 percent
*Elevation:* 3,300 to 3,800 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Glaciercreek and similar soils: 90 percent

**Minor Components**
Loonlake gravelly silt loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

**Major Component Description**
*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Volcanic ash over alluvium or outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.7 inches

**671C—Glaciercreek gravelly silt loam, 2 to 8 percent slopes**

**Setting**
*Landform:* Terraces and alluvial fans
*Slope:* 2 to 8 percent
*Elevation:* 2,200 to 2,800 feet
*Mean annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Glaciercreek and similar soils: 90 percent

**Minor Components**
Dewberry silt loam: 0 to 6 percent
Oldtrail gravelly sandy loam: 0 to 2 percent
Slopes greater than 8 percent: 0 to 2 percent

**Major Component Description**
*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Volcanic ash over alluvium or outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches

**671E—Glaciercreek gravelly silt loam, 8 to 30 percent slopes**

**Setting**
*Landform:* Terraces and alluvial fans
*Slope:* 8 to 30 percent
*Elevation:* 2,200 to 2,800 feet
*Mean annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Glaciercreek and similar soils: 90 percent

**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Dewberry gravelly silt loam: 0 to 4 percent
Oldtrail gravelly sandy loam: 0 to 1 percent

**Major Component Description**
*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

867E—Glaciercreek gravelly silt loam, cool, 8 to 30 percent slopes

Setting
Landform: Stream terraces and outwash plains
Position on landform: Risers
Slope: 8 to 30 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Glaciercreek and similar soils: 90 percent
Minor Components
Loonlake gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

867F—Glaciercreek gravelly silt loam, cool, 30 to 45 percent slopes

Setting
Landform: Stream terraces and outwash plains
Position on landform: Risers
Slope: 30 to 45 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Glaciercreek and similar soils: 90 percent
Minor Components
Tamarack loam: 0 to 5 percent
Slopes greater than 45 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

Grantsdale Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate to the 2C horizon; rapid below this depth
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Elevation: 2,400 to 3,000 feet
Annual air temperature: 43 to 45 degrees F
Annual precipitation: 11 to 17 inches
Frost-free period: 105 to 125 days
### Soil Survey

**Taxonomic Class:** Coarse-silty over sandy or sandy-skeletal, mixed, superactive, frigid Calcic Haploxerolls

**Typical Pedon**

Grantsdale silt loam, 0 to 4 percent slopes, in an area of pasture, 1,700 feet north and 1,500 feet west of the southeast corner of sec. 27, T. 18 N., R. 21 W.

**Ap**—0 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; neutral; abrupt smooth boundary.

**Bw**—7 to 14 inches; grayish brown (10YR 5/2) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; neutral; clear smooth boundary.

**Bk1**—14 to 21 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine irregular masses of lime; violently effervescent; neutral; gradual smooth boundary.

**Bk2**—21 to 27 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; few fine irregular masses of lime; strongly effervescent; slightly alkaline; clear smooth boundary.

**2C**—27 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few fine roots; 15 percent cobbles and 50 percent pebbles; slightly alkaline.

### Range in Characteristics

**Soil temperature:** 45 to 47 degrees F

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

**Thickness of the mollic epipedon:** 7 to 14 inches

**Depth to the Bk horizon:** 14 to 20 inches

**Ap horizon**

- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 10 to 18 percent
- Reaction: pH 6.1 to 7.3

**Bw horizon**

- Value: 4, 5, or 6 dry; 3 or 4 moist
- Chroma: 2 or 3
- Texture: Loam, very fine sandy loam, or silt loam
- Clay content: 10 to 18 percent
- Reaction: pH 6.1 to 7.3

**Bk horizons**

- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 2 or 3
- Texture: Loam, very fine sandy loam, or silt loam
- Clay content: 10 to 18 percent
- Calcium carbonate equivalent: 5 to 15 percent
- Reaction: pH 7.4 to 8.4

**2C horizon**

- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 2 or 3
- Texture: Loamy sand or sand
- Clay content: 5 to 10 percent
- Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles; 30 to 50 percent pebbles
- Calcium carbonate equivalent: 1 to 15 percent
- Reaction: pH 7.4 to 8.4

### 1A—Grantsdale silt loam, 0 to 4 percent slopes

#### Setting

**Landform:** Stream terraces

**Position on landform:** Treads

**Slope:** 0 to 4 percent

**Elevation:** 2,400 to 3,000 feet

**Mean annual precipitation:** 11 to 17 inches

**Frost-free period:** 105 to 125 days

#### Composition

**Major Components**

Grantsdale and similar soils: 85 percent

**Minor Components**

Gird silt loam: 0 to 5 percent

McCollum fine sandy loam: 0 to 5 percent

Slopes greater than 4 percent: 0 to 3 percent

Lamoose and similar soils: 0 to 2 percent

#### Major Component Description

**Surface layer texture:** Silt 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 5.5 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.

Half Moon Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 2 to 60 percent
Elevation: 2,500 to 3,500 feet
Annual precipitation: 20 to 34 inches
Annual air temperature: 40 to 44 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Fine-silty, mixed, active, frigid
Typic Haplustalfs

Typical Pedon
Half Moon silt loam, 2 to 8 percent slopes, in an area of forestland, 2,100 feet south and 1,050 feet east of the northwest corner of sec. 8, T. 19 N., R. 26 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
E—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common fine and medium and few coarse roots; neutral; clear smooth boundary.
E/Bt—4 to 14 inches; E part (70 percent) is pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; B part (30 percent) is light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; few faint clay films on faces of peds; neutral; clear smooth boundary.
Bt—14 to 26 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; strong medium angular blocky structure; hard, firm, moderately sticky, moderately plastic; common fine and few medium roots; common faint clay films on faces of peds and lining pores; neutral; clear smooth boundary.
Bk—26 to 35 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; few fine irregular masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.
C—35 to 60 inches; very pale brown (10YR 7/4) stratified very fine sandy loam and silt loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky, slightly plastic; few fine irregular masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 14 to 35 inches

E horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent pebbles
Reaction: pH 4.5 to 7.3

E/Bt horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: E part: 2 or 3; B part: 3 or 4
Clay content: 15 to 25 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles
Reaction: pH 4.5 to 7.3

Bt horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Silt loam or silty clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.8

Bk horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2, 3, or 4  
Texture: Silt loam or silty clay loam  
Clay content: 25 to 30 percent  
Calcium carbonate equivalent: 5 to 15 percent  
Electrical conductivity (mmhos/cm): 0 to 4  
Reaction: pH 7.4 to 8.4

**C horizon**
Hue: 2.5Y, 10YR, or 7.5YR  
Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 2, 3, or 4  
Texture: Very fine sandy loam or silt loam with thin lenses of silty clay  
Clay content: 20 to 30 percent  
Calcium carbonate equivalent: 5 to 10 percent  
Electrical conductivity (mmhos/cm): 0 to 4  
Reaction: pH 7.9 to 9.0

**70B—Half Moon silt loam, 2 to 8 percent slopes**

**Setting**
*Landform:* Lake plains or terraces  
*Position on landform:* Treads  
*Slope:* 2 to 8 percent  
*Elevation:* 2,500 to 3,200 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Half Moon and similar soils: 90 percent

**Minor Components**
Slopes greater than 8 percent: 0 to 4 percent  
Selon fine sandy loam: 0 to 4 percent  
Half moon gravelly loam: 0 to 2 percent

**Major Component Description**
*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Lacustrine deposits  
*Native plant cover type:* Forestland  
*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.

**70D—Half Moon silt loam, 8 to 15 percent slopes**

**Setting**
*Landform:* Lake plains or terraces  
*Position on landform:* Treads  
*Slope:* 8 to 15 percent  
*Elevation:* 2,500 to 3,200 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Half Moon and similar soils: 90 percent

**Minor Components**
Slopes greater than 15 percent: 0 to 4 percent  
Selon fine sandy loam: 0 to 4 percent  
Half moon gravelly loam: 0 to 2 percent

**Major Component Description**
*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Lacustrine deposits  
*Native plant cover type:* Forestland  
*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.

**70E—Half Moon silt loam, 15 to 30 percent slopes**

**Setting**
*Landform:* Lake plains or terraces  
*Position on landform:* Dissected or incised treads  
*Slope:* 15 to 30 percent  
*Elevation:* 2,500 to 3,200 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Half Moon and similar soils: 90 percent
**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Selon fine sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Lacustrine deposits
*Native plant cover type:* Forestland
*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.

**291B—Half Moon silt loam, cool, 2 to 8 percent slopes**

**Setting**

*Landform:* Lake plains or terraces
*Position on landform:* Treads
*Slope:* 2 to 8 percent
*Elevation:* 3,100 to 3,500 feet
*Mean annual precipitation:* 28 to 34 inches
*Frost-free period:* 70 to 80 days

**Composition**

**Major Components**
Half Moon and similar soils: 85 percent

**Minor Components**
Whitpine silt loam: 0 to 7 percent
Rumblecreek, dry: 0 to 3 percent
Slopes greater than 8 percent: 0 to 3 percent
Auggie silt loam: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Lacustrine deposits
*Native plant cover type:* Forestland
*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.

**291D—Half Moon silt loam, cool, 8 to 15 percent slopes**

**Setting**

*Landform:* Lake plains or terraces
*Position on landform:* Treads
*Slope:* 8 to 15 percent
*Elevation:* 3,100 to 3,500 feet
*Mean annual precipitation:* 28 to 34 inches
*Frost-free period:* 70 to 80 days

**Composition**

**Major Components**
Half Moon and similar soils: 90 percent

**Minor Components**
Auggie silt loam: 0 to 3 percent
Crystalex loamy coarse sand: 0 to 3 percent
Glaciercreek, cool: 0 to 2 percent
Slopes greater than 15 percent: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Lacustrine deposits
*Native plant cover type:* Forestland
*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.

**291E—Half Moon silt loam, cool, 15 to 35 percent slopes**

**Setting**

*Landform:* Lake plains or terraces
*Position on landform:* Risers
*Slope:* 15 to 35 percent
*Elevation:* 3,100 to 3,500 feet
*Mean annual precipitation:* 28 to 34 inches
*Frost-free period:* 70 to 80 days
Composition

Major Components
Half Moon and similar soils: 90 percent

Minor Components
Auggie silt loam: 0 to 5 percent
Slopes greater than 35 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Forestland
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.

291F—Half Moon silt loam, cool, 35 to 60 percent slopes

Setting
Landform: Lake plains or terraces
Slope: 35 to 60 percent
Elevation: 3,100 to 3,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 80 days

Composition

Major Components
Half Moon and similar soils: 90 percent

Minor Components
Auggie silt loam: 0 to 7 percent
Tamarack loam: 0 to 3 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
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.

Hewolf Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately rapid to the 2C horizon; rapid below this depth
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,500 to 2,800 feet
Annual precipitation: 14 to 16 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Fluventic Haploxerolls

Typical Pedon
Hewolf gravelly loam, 0 to 2 percent slopes, in an area of irrigated pasture, 700 feet south and 1,500 feet east of the northwest corner of sec. 27, T. 18 N., R. 21 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; 20 percent pebbles; neutral; clear smooth boundary.

Bw—7 to 13 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; 40 percent pebbles; neutral; clear wavy boundary.

2C—13 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 5 percent cobbles and 60 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 12 and 35 inches
Thickness of the mollic epipedon: 7 to 11 inches
Depth to the seasonal high water table: 60 to 72 inches
Notes: Where uncultivated, the Ap horizon contains an irregular decrease in organic carbon. The Bw horizon may not be present in all pedons.

Ap horizon
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 1, 2, or 3
- Clay content: 8 to 15 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

Bw horizon
- Value: 5 or 6 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: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles
- Reaction: pH 6.6 to 7.3

2C horizon
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 2 or 3
- Texture: Sand or loamy sand
- Clay content: 0 to 5 percent
- Content of rock fragments: 45 to 75 percent—0 to 10 percent cobbles; 45 to 65 percent pebbles
- Reaction: pH 6.6 to 7.3

8A—Hewolf gravelly loam, 0 to 2 percent slopes

Setting
- Landform: Stream terraces
- Position on landform: Treads
- Slope: 0 to 2 percent
- Elevation: 2,500 to 2,800 feet
- Mean annual precipitation: 14 to 16 inches
- Frost-free period: 90 to 110 days

Composition
- Major Components
  - Hewolf and similar soils: 90 percent
- Minor Components
  - Grantsdale silt loam: 0 to 7 percent
  - Lamoose and similar soils: 0 to 3 percent

Major Component Description
- Surface layer texture: Gravely loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Moderately well drained
- Dominant parent material: Alluvium
- Native plant cover type: Rangeland
- Flooding: Rare
- 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.

Hogheaven Series

Depth class: Very deep
- Drainage class: Somewhat poorly drained
- Permeability: Moderate
- Landform: Flood plains
- Parent material: Alluvium
- Slope range: 0 to 2 percent
- Elevation: 2,700 to 3,000 feet
- Annual precipitation: 12 to 14 inches
- Annual air temperature: 41 to 43 degrees F
- Frost-free period: 105 to 120 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Aquic Haploxerolls

Typical Pedon

Hogheaven silt loam, 0 to 2 percent slopes, in an area of pasture, 2,800 feet south and 1,250 feet west of the northeast corner of sec. 13, T. 24 N., R. 23 W.

Apn1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and common medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Apn2—2 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common
fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bkn1—8 to 15 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; disseminated lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bkn2—15 to 21 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; few fine pores; disseminated lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C1—21 to 42 inches; white (10YR 8/2) silt loam, brown (10YR 5/3) moist; few faint yellowish brown (10YR 5/8) redox concentrations; massive; soft, very friable, nonsticky, nonplastic; few fine and very fine roots; moderately alkaline; gradual smooth boundary.

C2—42 to 60 inches; white (10YR 8/2) silt loam, pale brown (10YR 6/3) moist; common faint yellowish brown (10YR 5/8) redox concentrations; massive; soft, very friable, nonsticky, nonplastic; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bkn horizon: 5 to 12 inches
Depth to the seasonal high water table: 24 to 42 inches

Note: In the Apn horizons, a thin surface layer may have a sodium adsorption ratio from 10 to 13.

Apn horizons
Value: 2 or 3 moist; 4 or 5 dry
Chroma: 1 or 2
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 3 to 15 percent
Electrical conductivity (mmhos/cm): 0 to 3
Sodium adsorption ratio: 10 to 20
Reaction: pH 7.9 to 9.0

Bkn horizons
Value: 3, 4, or 5 moist; 5, 6, or 7 dry
Chroma: 2, 3, or 4
Texture: Silt loam or silt
Clay content: 5 to 18 percent
Calcium carbonate equivalent: 3 to 15 percent
Electrical conductivity (mmhos/cm): 0 to 3
Sodium adsorption ratio: 10 to 20
Reaction: pH 7.9 to 9.0

C horizons
Value: 4, 5, or 6 moist; 6, 7, or 8 dry
Chroma: 2, 3, or 4
Texture: Silt loam, very fine sandy loam, or silt
Clay content: 5 to 18 percent
Electrical conductivity (mmhos/cm): 0 to 1
Sodium adsorption ratio: 5 to 13
Reaction: pH 7.9 to 8.4

85A—Hogheaven silt loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,700 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 120 days

Composition

Major Components
Hogheaven and similar soils: 85 percent

Minor Components
Sonyok silty clay loam: 0 to 8 percent
Marklepass silty clay loam: 0 to 4 percent
Slopes greater than 2 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Silt 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
Sodium affected: Sodic within 30 inches
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.
**Hogsby Series**

*Depth class:* Shallow  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Hills  
*Parent material:* Residuum and colluvium derived from argillite and quartzite  
*Slope range:* 8 to 60 percent  
*Elevation:* 2,600 to 5,200 feet  
*Annual precipitation:* 15 to 20 inches  
*Annual air temperature:* 39 to 45 degrees F  
*Frost-free period:* 90 to 120 days

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

**Typical Pedon**

Hogsby cobbly loam, in an area of Bigarm-Hogsby-Rock outcrop complex, 30 to 60 percent slopes, in an area of rangeland, 350 feet south and 2,750 feet east of the northwest corner of sec. 10, T. 19 N., R. 22 W.

A—0 to 9 inches: grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky, nonplastic; common very fine and medium roots; 25 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bw—9 to 12 inches: pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common fine and few medium roots; 25 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

C—12 to 17 inches: pale brown (10YR 6/3) extremely channery loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; 30 percent pebbles and 40 percent channers; neutral; clear smooth boundary.

R—17 inches: argillite bedrock.

**Range in Characteristics**

*Soil temperature:* 41 to 47 degrees F  
*Moisture control section:* Between 8 and 24 inches  
*Thickness of the mollic epipedon:* 7 to 12 inches  
*Depth to bedrock:* 10 to 20 inches

**A horizon**

Value: 4 or 5 dry; 2 or 3 moist  
Chroma: 2 or 3

Clay content: 10 to 18 percent  
Content of rock fragments: 15 to 35 percent—  
15 to 25 percent cobbles; 0 to 10 percent pebbles  
Reaction: pH 6.6 to 7.3

**Bw horizon**

Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 10 to 18 percent  
Content of rock fragments: 35 to 70 percent—  
20 to 35 percent cobbles; 15 to 35 percent pebbles  
Reaction: pH 6.6 to 7.3

**C horizon**

Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 10 to 18 percent  
Content of rock fragments: 60 to 75 percent—  
30 to 40 percent cobbles; 30 to 35 percent pebbles or channers  
Reaction: pH 6.6 to 7.3

**53F—Hogsby-Rubble land-Rock outcrop complex, 15 to 60 percent slopes**

**Setting**

*Landform:* Hills  
*Slope:* 15 to 60 percent  
*Elevation:* 2,600 to 4,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 120 days

**Composition**

**Major Components**

Hogsby and similar soils: 35 percent  
Rubble land: 25 percent  
Rock outcrop: 25 percent

**Minor Components**

Bigarm gravelly loam: 0 to 5 percent  
Finley point gravelly loam: 0 to 5 percent  
Slopes greater than 60 percent: 0 to 5 percent

**Major Component Description**

**Hogsby**

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium or residuum  
*Native plant cover type:* Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Rubble land
Definition: Areas covered by boulders or stones that support little or no vegetation.

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

153F—Hogsby-Finleypoint-Rock outcrop complex, 30 to 60 percent slopes

Setting
Landform:
• Hogsby—Hills
• Finleypoint—Hills
Slope:
• Hogsby—30 to 60 percent
• Finleypoint—30 to 60 percent
Elevation: 3,000 to 4,800 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 90 to 105 days

Composition
Major Components
Hogsby and similar soils: 35 percent
Finleypoint and similar soils: 35 percent
Rock outcrop: 15 percent

Minor Components
Areas of rubble land: 0 to 7 percent
Bigarm gravelly loam: 0 to 5 percent
Slopes greater than 60 percent: 0 to 3 percent

Major Component Description
Hogsby
Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium or residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Finleypoint
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

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

Holloway Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Volcanic ash over colluvium derived from argillite or quartzite
Slope range: 8 to 70 percent
Elevation: 3,800 to 7,000
Annual precipitation: 28 to 50 inches
Annual air temperature: 35 to 42 degrees F
Frost-free period: 30 to 60 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Eutrochrepts

Typical Pedon
Holloway gravelly silt loam, 35 to 60 percent slopes, in an area of forestland, 2,000 feet north and 600 feet east of the southwest corner of sec. 18, T. 21 N., R. 24 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 9 inches; brownish yellow (10YR 6/6) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 15 percent pebbles; slightly acid; clear smooth boundary.
2E—9 to 21 inches; light gray (10YR 7/2) very gravelly fine sandy loam, grayish brown (10YR
moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 5 percent cobbles and 45 percent pebbles; slightly acid; gradual wavy boundary.

2E/Bw—21 to 41 inches; E part (80 percent) is light brownish gray (10YR 6/2) extremely gravelly fine sandy loam, grayish brown (10YR 5/2) moist; B part (20 percent) is brown (10YR 5/3) extremely gravelly loam, dark brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; 10 percent cobbles and 55 percent pebbles; slightly acid; gradual wavy boundary.

2C—41 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent cobbles and 65 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 39 to 44 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the volcanic ash-influenced layer: 7 to 14 inches

A horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6
Clay content: 5 to 15 percent
Content of rock fragments: 10 to 35 percent—0 to 10 percent stones and cobbles; 10 to 25 percent pebbles
Moist bulk density: 1.0 g/cm³ or less
Acid oxalate extractable Al + ½ Fe: 1 to 2 percent
Reaction: pH 5.1 to 6.5

2E horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2, 3, or 4
Texture: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 45 to 75 percent—0 to 15 percent stones and cobbles; 45 to 60 percent pebbles
Reaction: pH 5.1 to 6.5

2E/Bw horizon
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2, 3, or 4
Texture, mixed: Sandy loam or fine sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 80 percent—5 to 15 percent stones and cobbles; 55 to 65 percent pebbles
Reaction: pH 5.1 to 6.5

40E—Holloway gravelly silt loam, 15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 4,800 to 6,500 feet
Mean annual precipitation: 36 to 45 inches
Frost-free period: 40 to 60 days

Composition
Major Components
Holloway and similar soils: 85 percent

Minor Components
Waldbillig gravelly silt loam: 0 to 4 percent
Slopes greater than 35 percent: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Holloway, cool: 0 to 4 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 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.
40F—Holloway gravelly silt loam, 35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 4,800 to 6,500 feet
Mean annual precipitation: 36 to 45 inches
Frost-free period: 40 to 60 days

Composition
Major Components
Holloway and similar soils: 85 percent

Minor Components
Holloway, cool: 0 to 4 percent
Waldbillig gravelly silt loam: 0 to 4 percent
Slopes greater than 60 percent: 0 to 4 percent
Areas of rubble land: 0 to 2 percent
Areas of rock outcrop: 0 to 1 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches

Rubble land
Definition: Areas covered by boulders or stones that support 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.

40G—Holloway-Rubble land complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 4,800 to 6,500 feet
Mean annual precipitation: 36 to 45 inches
Frost-free period: 40 to 60 days

Composition
Major Components
Holloway and similar soils: 60 percent
Rubble land: 25 percent

Minor Components
Holloway, bouldery: 0 to 5 percent
Mitten gravelly silt loam: 0 to 4 percent
Slopes greater than 70 percent: 0 to 3 percent
Holloway, cool: 0 to 3 percent

Major Component Description
Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches

Rubble land
Definition: Areas covered by boulders or stones that support 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.

42E—Holloway gravelly silt loam, cool, 15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 30 to 50 days

Composition
Major Components
Holloway and similar soils: 85 percent

Minor Components
Phillcher gravelly silt loam: 0 to 5 percent
Slopes greater than 35 percent: 0 to 5 percent
Areas of rubble land: 0 to 5 percent
Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
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.

42G—Holloway, cool-Rock outcrop complex, 40 to 70 percent slopes

Setting

Landform: Mountains
Slope: 40 to 70 percent
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 30 to 50 days

Composition

Major Components
Holloway and similar soils: 60 percent
Rock outcrop: 25 percent

Minor Components
Phillcher gravelly silt loam: 0 to 5 percent
Slopes greater than 70 percent: 0 to 5 percent
Areas of rubble land: 0 to 5 percent

Major Component Description

Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

Management

For management information about this map unit, see appropriate sections in Part II of this publication.
143F—Holloway-Waldbillig gravelly silt loams, 30 to 50 percent slopes

Setting

Landform:
- Holloway—Mountains
- Waldbillig—Mountains

Slope:
- Holloway—30 to 50 percent
- Waldbillig—30 to 50 percent

Elevation: 4,800 to 6,500 feet
Mean annual precipitation: 36 to 45 inches
Frost-free period: 40 to 50 days

Composition

Major Components
- Holloway and similar soils: 50 percent
- Waldbillig and similar soils: 35 percent

Minor Components
- Areas of rock outcrop: 0 to 5 percent
- Slopes greater than 50 percent: 0 to 5 percent
- Waldbillig, stony: 0 to 3 percent
- Waldbillig, bouldery: 0 to 2 percent

Major Component Description

Holloway
- Surface layer texture: Gravelly silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Somewhat excessively drained
- Dominant parent material: Volcanic ash over colluvium
- Native plant cover type: Forestland
- Flooding: None
- Available water capacity: Mainly 3.3 inches

Waldbillig
- Surface layer texture: Gravelly silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Volcanic ash over till or drift
- 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.

144F—Holloway-Waldbillig gravelly silt loams, cool, 30 to 50 percent slopes

Setting

Landform:
- Holloway—Mountains
- Waldbillig—Mountains

Slope:
- Holloway—30 to 50 percent
- Waldbillig—30 to 50 percent

Elevation: 5,500 to 7,000 feet
Mean annual precipitation: 40 to 50 inches
Frost-free period: 30 to 50 days

Composition

Major Components
- Holloway and similar soils: 50 percent
- Waldbillig and similar soils: 35 percent

Minor Components
- Phillcher gravelly silt loam: 0 to 5 percent
- Slopes greater than 50 percent: 0 to 4 percent
- Areas of rock outcrop: 0 to 3 percent
- Areas of rubble land: 0 to 3 percent

Major Component Description

Holloway
- Surface layer texture: Gravelly silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Somewhat excessively drained
- Dominant parent material: Volcanic ash over colluvium
- Native plant cover type: Forestland
- Flooding: None
- Available water capacity: Mainly 3.4 inches

Waldbillig
- Surface layer texture: Gravelly silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Volcanic ash over till or drift
- 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.
322E—Holloway gravelly silt loam, moist, 15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 3,800 to 5,600 feet
Mean annual precipitation: 28 to 38 inches
Frost-free period: 40 to 60 days

Composition
Major Components
Holloway and similar soils: 90 percent

Minor Components
Slopes greater than 35 percent: 0 to 5 percent
Felan gravelly silt loam: 0 to 3 percent
Areas of rock outcrop: 0 to 1 percent
Holloway moist, seeped: 0 to 1 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 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.

322F—Holloway gravelly silt loam, moist, 35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,800 to 6,400 feet
Mean annual precipitation: 28 to 38 inches
Frost-free period: 40 to 60 days

Composition
Major Components
Holloway and similar soils: 90 percent

Minor Components
Bata gravelly silt loam: 0 to 3 percent
Rumblecreek gravelly loam: 0 to 3 percent
Felan gravelly silt loam: 0 to 2 percent
Areas of rock outcrop: 0 to 2 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 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.

323G—Holloway, moist—Rock outcrop complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 4,800 to 6,400 feet
Mean annual precipitation: 34 to 48 inches
Frost-free period: 30 to 50 days

Composition
Major Components
Holloway and similar soils: 70 percent
Rock outcrop: 20 percent

Minor Components
Felan gravelly silt loam: 0 to 5 percent
Areas of rubble land: 0 to 5 percent

Major Component Description
Holloway
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

Horseplains Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,400 to 2,600 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 105 to 120 days

Taxonomic Class: Sandy, mixed, frigid Typic Xerofluvents

Typical Pedon
Horseplains fine sandy loam, 0 to 2 percent slopes, in an area of forestland, 1,400 feet north and 500 feet east of the southwest corner of sec. 16, T. 20 N., R. 26 W.

A—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many fine and medium and common coarse roots; neutral; clear smooth boundary.

C1—4 to 10 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; many fine, common medium and few coarse roots; neutral; clear wavy boundary.

C2—10 to 35 inches; pale brown (10YR 6/3) stratified loamy fine sand and fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; many fine, common medium, and few coarse roots; neutral; clear smooth boundary.

C3—35 to 39 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky, nonplastic; common fine and medium and few coarse roots; slightly alkaline; clear smooth boundary.

C4—39 to 60 inches; pale brown (10YR 6/3) stratified loamy fine sand and fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; common fine and medium and few coarse roots; neutral.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 12 and 35 inches

A horizon
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 7.3

C1 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 7.3

C2 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Texture: Loamy fine sand or fine sand
Clay content: 0 to 10 percent
Reaction: pH 6.6 to 7.3

C3 horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Very fine sandy loam or fine sandy loam
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 7.8

C4 horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Texture: Loamy fine sand or fine sand
Clay content: 0 to 10 percent
Reaction: pH 6.6 to 7.8

51A—Horseplains-Riverwash complex, 0 to 2 percent slopes

Setting
Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,400 to 2,600 feet
Mean annual precipitation: 15 to 19 inches  
Frost-free period: 105 to 120 days

**Composition**

**Major Components**
- Horseplains and similar soils: 55 percent
- Riverwash: 35 percent

**Minor Components**
- Slopes greater than 2 percent: 0 to 4 percent
- Horseplains, channeled: 0 to 4 percent
- Lamoose and similar soils: 0 to 2 percent

**Major Component Description**
- **Horseplains**
  - Surface layer texture: Fine sandy loam
  - Depth class: Very deep (more than 60 inches)
  - Drainage class: Somewhat excessively drained
  - Dominant parent material: Alluvium
  - Native plant cover type: Forestland
  - Flooding: Occasional
  - Available water capacity: Mainly 4.9 inches

**Riverwash**
- Definition: Unstable, flooded areas of sandy or gravelly sediments that support little or no vegetation.
- Flooding: Frequent

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

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

**251A—Horseplains fine sandy loam, gravelly substratum, 0 to 2 percent slopes**

**Setting**
- Landform: Flood plains
- Slope: 0 to 2 percent
- Elevation: 2,400 to 2,600 feet
- Mean annual precipitation: 15 to 19 inches
- Frost-free period: 105 to 120 days

**Composition**
- Major Components
  - Horseplains and similar soils: 85 percent
- Minor Components
  - Areas of riverwash: 0 to 5 percent
  - Horseplains, channeled: 0 to 5 percent
  - Slopes greater than 2 percent: 0 to 4 percent
  - Lamoose and similar soils: 0 to 1 percent

**Major Component Description**
- Surface layer texture: Fine sandy loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Somewhat excessively drained
- Dominant parent material: Alluvium
- Native plant cover type: Forestland
- Flooding: Occasional
- Available water capacity: Mainly 6.0 inches

**93A—Horseplains fine sandy loam, 0 to 2 percent slopes**

**Setting**
- Landform: Flood plains
- Slope: 0 to 2 percent
- Elevation: 2,400 to 2,600 feet
- Mean annual precipitation: 15 to 19 inches
- Frost-free period: 105 to 120 days

**Composition**
- Major Components
  - Horseplains and similar soils: 90 percent
- Minor Components
  - Slopes greater than 2 percent: 0 to 5 percent
  - Horseplains, channeled: 0 to 5 percent

**Major Component Description**
- Surface layer texture: Fine sandy loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Somewhat excessively drained
- Dominant parent material: Alluvium
- Native plant cover type: Forestland
- Flooding: Occasional
- 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.

Ibex Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate above the 2C horizon; rapid in the 2C horizon
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 2,200 to 2,600 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, acid, frigid Typic Endoaquepts

Typical Pedon

Ibex silt loam, 0 to 2 percent slopes, in an area of forestland, 200 feet south and 600 feet west of the northeast corner of sec. 16, T. 28 N., R. 33 W.

A—0 to 1 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; hard, very friable, nonsticky, nonplastic; many very fine and fine roots; strongly acid; abrupt smooth boundary.

E—1 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; hard, very friable, nonsticky, nonplastic; many very fine and common fine roots; strongly acid; abrupt wavy boundary.

Bw1—4 to 9 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak very coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; few distinct strong brown (7.5YR 5/6) redox concentrations; strongly acid; abrupt wavy boundary.

Bw2—9 to 25 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak very coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; few distinct strong brown (7.5YR 5/6) redox concentrations; strongly acid (pH 5.4); gradual wavy boundary.

C1—25 to 29 inches; variegated colors consisting of 80 percent grayish brown (10YR 5/2) and 20 percent gray (10YR 5/1) fine sandy loam, light gray (10YR 7/2 and 7/1) dry; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common distinct strong brown (7.5YR 4/6) redox concentrations; strongly acid; clear wavy boundary.

2C2—29 to 52 inches; gray (10YR 5/1) extremely gravelly coarse sand, light gray (10YR 7/1) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; 10 percent cobbles and 55 percent pebbles; strongly acid; clear wavy boundary.

2C3—52 to 60 inches; dark brown (7.5YR 4/4) extremely gravelly coarse sand, brown (7.5YR 5/4) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; 10 percent cobbles and 55 percent pebbles; strongly acid.

Range in Characteristics

Soil temperature: 42 to 45 degrees F
Depth to the 2C horizon: 25 to 35 inches
Depth to the seasonal high water table: 12 to 24 inches

A horizon
- Value: 2 or 3 moist; 4, 5, or 6 dry
- Chroma: 2 or 3
- Clay content: 4 to 12 percent; less than 15 percent fine sand or coarser
- Reaction: pH 4.5 to 5.5

E horizon
- Clay content: 4 to 12 percent; less than 15 percent fine sand or coarser
- Reaction: pH 4.5 to 5.5

Bw1 horizon
- Clay content: 4 to 12 percent; less than 15 percent fine sand or coarser
- Reaction: pH 4.5 to 5.5

Bw2 horizon
- Hue: 10YR or 2.5Y
- Value: 4 or 5 moist; 6 or 7 dry
- Texture: Silt loam or very fine sandy loam
- Clay content: 4 to 12 percent; less than 15 percent fine sand and coarser
- Reaction: pH 4.5 to 5.5

C1 horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 3, 4, or 5 moist; 5, 6, or 7 dry
- Chroma: 0, 1, or 2
A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

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

### Iffgulch Series

**Depth class:** Very deep  
**Drainage class:** Poorly drained  
**Permeability:** Slow  
**Landform:** Drainageways  
**Parent material:** Alluvium from glaciolacustrine deposits  
**Slope range:** 0 to 4 percent  
**Elevation range:** 2,400 to 2,800 feet  
**Annual precipitation:** 28 to 32 inches  
**Annual air temperature:** 42 to 45 degrees F  
**Frost-free period:** 90 to 105 days  

**Taxonomic Class:** Fine, mixed, active, frigid Typic Endoaquolls

#### Typical Pedon

Iffgulch clay, 0 to 4 percent slopes, in an area of forestland, 1,500 feet south and 2,100 feet west of the northeast corner of sec. 36, T. 25 N., R. 32 W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; strong fine and medium granular structure; hard, firm, moderately sticky, moderately plastic; many very fine, fine, and medium roots; moderately acid; clear wavy boundary.

Bg1—2 to 10 inches; very dark gray (10YR 3/1) clay, gray (10YR 5/1) dry; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky, moderately plastic; many very fine, fine, and medium roots; slightly acid; clear wavy boundary.

Bg2—10 to 24 inches; gray (5Y 5/1) silty clay, gray (5Y 6/1) dry; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, moderately plastic; common very fine, fine, and medium roots; few fine prominent yellowish brown (10YR 5/6) redox concentrations; neutral; clear wavy boundary.

Bg3—24 to 33 inches; gray (5Y 6/1) silty clay, light gray (5Y 7/1) dry; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, moderately plastic; many very fine, fine, and medium roots; slightly acid; clear wavy boundary.
blocky; very hard, very firm, moderately sticky, moderately plastic; common very fine, fine, and medium roots; few fine prominent yellowish brown (10YR 5/6) redox concentrations; neutral; clear wavy boundary.

Cg1—33 to 46 inches; gray (5Y 6/1) clay loam, light gray (5Y 7/1) dry; massive; very hard, very firm, moderately sticky, moderately plastic; few fine and medium roots; common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations and many fine and medium distinct greenish gray (5G 6/1) redox depletions; neutral; gradual wavy boundary.

Cg2—46 to 60 inches; gray (5Y 6/1) gravelly clay loam, light gray (5Y 7/1) dry; massive; very hard, very firm, moderately sticky, moderately plastic; few fine and medium roots; common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations and many fine and medium distinct greenish gray (5G 6/1) redox depletions; 15 percent pebbles and 5 percent cobbles; neutral.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the seasonal high water table: 12 to 24 inches

A horizon
Value: 2 or 3 moist; 3, 4, or 5 dry
Clay content: 40 to 60 percent
Reaction: pH 5.6 to 6.5

Bg1 horizon
Value: 2 or 3 moist; 4 or 5 dry
Texture: Silty clay loam
Clay content: 40 to 60 percent
Reaction: pH 5.6 to 6.5

Bg2 and Bg3 horizons
Value: 4, 5, or 6 moist; 5, 6, or 7 dry
Clay content: 40 to 60 percent
Reaction: pH 5.6 to 7.3

Cg1 horizon
Hue: 5Y, 5GY, or 5G
Value: 4, 5, or 6 moist; 5, 6, or 7 dry
Clay content: 27 to 40 percent
Reaction: pH 5.6 to 7.3

Cg2 horizon
Hue: 5Y, 5GY, or 5G
Value: 4, 5, or 6 moist; 5, 6, or 7 dry
Clay content: 27 to 40 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

89B—Iffgulch clay, 0 to 4 percent slopes

Setting

Landform: Drainageways
Slope: 0 to 4 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Iffgulch and similar soils: 90 percent

Minor Components
Fernline silt loam: 0 to 5 percent
Larchpoint silt loam: 0 to 3 percent
Bigbeaver, occasionally flooded: 0 to 2 percent

Major Component Description

Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 9.9 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.

Irvine Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 4 to 60 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
**Taxonomic Class:** Fine, illitic, calcareous, frigid Typic Xerorthents

**Typical Pedon**

Irvine silty clay loam, in an area of Irvine-Round Butte silty clay loams, 8 to 35 percent slopes, in an area of rangeland, 2,600 feet north and 1,000 feet west of the southeast corner of sec. 13, T. 21 N., R. 22 W.

A—0 to 3 inches; light gray (10YR 7/1) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium platy structure; slightly hard, friable, moderately sticky, slightly plastic; many very fine and fine roots; slightly alkaline; abrupt smooth boundary.

C1—3 to 7 inches; light gray (10YR 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine and few medium roots; slightly effervescent; slightly alkaline; gradual smooth boundary.

C2—7 to 15 inches; very pale brown (10YR 7/3) silty clay, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and medium roots; disseminated lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—15 to 60 inches; very pale brown (10YR 8/3) silty clay, pale brown (10YR 6/3) moist; massive; 1/8- to 1/4-inch thick varves; hard, firm, moderately sticky, moderately plastic; few fine roots; disseminated lime; strongly effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature:** 42 to 47 degrees F

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

**Depth to the varved lake sediments:** 11 to 20 inches

**A horizon**

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 1, 2, or 3

Clay content: 35 to 40 percent

Electrical conductivity (mmhos/cm): 0 to 2

Reaction: pH 7.4 to 8.4

**C1 horizon**

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 50 percent

Electrical conductivity (mmhos/cm): 0 to 2

Sodium adsorption ratio: 8 to 13

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

**C2 horizon**

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 50 percent

Electrical conductivity (mmhos/cm): 0 to 2

Sodium adsorption ratio: 8 to 13

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

**C3 horizon**

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 50 percent

Electrical conductivity (mmhos/cm): 0 to 2

Sodium adsorption ratio: 8 to 13

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 9.0

**116E—Irvine-Round Butte silty clay loams, 8 to 35 percent slopes**

**Setting**

**Landform:**

- Irvine—Lake plains or terraces
- Round Butte—Lake plains or terraces

**Position on landform:**

- Irvine—Dissected or incised treads
- Round Butte—Dissected or incised treads

**Slope:**

- Irvine—8 to 35 percent
- Round Butte—8 to 15 percent

**Elevation:** 2,500 to 3,000 feet

**Mean annual precipitation:** 12 to 14 inches

**Frost-free period:** 105 to 125 days

**Composition**

**Major Components**

Irvine and similar soils: 55 percent

Round Butte and similar soils: 30 percent

**Minor Components**

Lonepine silt loam: 0 to 5 percent

Slopes greater than 35 percent: 0 to 5 percent

Areas of lake sediment outcrop: 0 to 5 percent
Major Component Description

Irvine
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches

Round Butte
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
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.

116F—Irvine-Lake sediment outcrop complex, 35 to 60 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Dissected or incised treads
Slope: 35 to 60 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Irvine and similar soils: 65 percent
Areas of lake sediment outcrop: 25 percent

Minor Components
Lonepine silt loam: 0 to 5 percent
Slopes greater than 60 percent: 0 to 5 percent

Major Component Description
Irvine
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches

Lake sediment outcrop
Definition: Areas of varved lacustrine deposits.

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

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

Jocko Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Elevation: 2,500 to 3,100 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 100 to 110 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Calcic Haploxerolls

Typical Pedon

Jocko gravelly loam, 0 to 4 percent slopes, in an area of rangeland, 20 feet north and 2,600 feet east of the southwest corner of sec. 23, T. 24 N., R. 23 W.

A—0 to 8 inches; grayish brown (10YR 5/2) gravelly loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 10 percent cobbles and 20 percent pebbles; neutral; clear wavy boundary.

Bw—8 to 15 inches; brown (10YR 5/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 10 percent cobbles and 25 percent pebbles and 25 percent pebbles; neutral; gradual wavy boundary.

Bk—15 to 60 inches; light brownish gray (10YR 6/2) extremely cobbly loamy sand, dark grayish brown
(10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 30 percent cobbles and 45 percent pebbles; disseminated lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 12 and 35 inches
Thickness of the mollic epipedon: 11 to 20 inches
Depth to the Bk horizon: 15 to 30 inches

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Content of rock fragments: 15 to 35 percent—0 to 15 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 6.6 to 7.3

Bw horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent pebbles
Reaction: pH 6.6 to 7.3

Bk horizon
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 5 percent
Content of rock fragments: 60 to 85 percent—15 to 30 percent cobbles; 45 to 55 percent pebbles
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 7.8

7B—Jocko gravelly loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,500 to 3,100 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 100 to 110 days

Composition

Major Components
Jocko and similar soils: 90 percent

Minor Components
Gardencreek silty clay loam: 0 to 5 percent
Slopes greater than 4 percent: 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 2.5 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.

Kerrdam Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Lake plains and terraces
Parent material: Eolian deposits
Slope range: 0 to 35 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Coarse-silty, mixed, active, frigid Calcic Haploxerepts

Typical Pedon

Kerrdam silt loam, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet south and 1,200 feet east of the northwest corner of sec. 25, T. 23 N., R. 24 W.

A—0 to 3 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; common very fine and fine and few medium roots; neutral; clear smooth boundary.

Bw1—3 to 7 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; common very fine and fine and few medium roots; neutral; clear smooth boundary.
Bw2—7 to 20 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine and fine roots; slightly effervescent; neutral; gradual smooth boundary.

Bk—20 to 30 inches; white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C—30 to 60 inches; white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky, nonplastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 46 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 12 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 7.3

Bw horizons
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 3 or 4
Clay content: 5 to 15 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

C horizon
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 2 or 3
Texture: Silt loam or very fine sandy loam
Clay content: 0 to 5 percent
Calcium carbonate equivalent: 2 to 10 percent
Reaction: pH 7.4 to 8.4

17B—Kerrdam silt loam, 0 to 4 percent slopes

Setting
Landform: Lake plains or terraces
Slope: 0 to 4 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Kerrdam and similar soils: 85 percent

Minor Components
Dryfork silt loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Eolian deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 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.

17D—Kerrdam silt loam, 4 to 15 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Dissected or incised treads
Slope: 4 to 15 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days
Composition

Major Components
Kerrdam and similar soils: 85 percent

Minor Components
Dryfork silt loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Eolian deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 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.

117E—Kerrdam silt loam, 15 to 35 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Dissected or incised treads
Slope: 15 to 35 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Kerrdam and similar soils: 85 percent

Minor Components
Lonepine silt loam: 0 to 5 percent
Sacheen loamy fine sand, dry: 0 to 5 percent
Slopes greater than 35 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Eolian deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 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.
**Drainage class:** Well drained  
**Dominant parent material:** Eolian deposits  
**Native plant cover type:** Rangeland  
**Flooding:** None  
**Available water capacity:** Mainly 10.0 inches

**Dryfork**
*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
**Dominant parent material:** Lacustrine deposits  
**Native plant cover type:** Rangeland  
**Flooding:** None  
**Sodium affected:** Sodic within 30 inches  
**Available water capacity:** Mainly 10.3 inches

**Vincom**
*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
**Dominant parent material:** Lacustrine deposits  
**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.

217E—Kerrdam-Round Butte-Irvine complex, 8 to 35 percent slopes

**Setting**

**Landform:**
- Kerrdam—Lake plains or terraces
- Round Butte—Lake plains or terraces
- Irvine—Lake plains or terraces

**Position on landform:**
- Kerrdam—Dissected or incised treads
- Round Butte—Dissected or incised treads
- Irvine—Dissected or incised treads

**Slope:**
- Kerrdam—8 to 20 percent
- Round Butte—8 to 15 percent
- Irvine—8 to 35 percent

**Elevation:** 2,500 to 3,000 feet  
**Mean annual precipitation:** 12 to 14 inches  
**Frost-free period:** 105 to 125 days

**Composition**

**Major Components**
- Kerrdam and similar soils: 30 percent  
- Round Butte and similar soils: 30 percent  
- Irvine and similar soils: 25 percent

**Minor Components**
- Slopes less than 8 percent: 0 to 5 percent  
- Areas of lake sediment outcrop: 0 to 5 percent  
- Slopes greater than 35 percent: 0 to 5 percent

**Major Component Description**

**Kerrdam**
*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
**Dominant parent material:** Eolian deposits  
**Native plant cover type:** Rangeland  
**Flooding:** None  
**Sodium affected:** Sodic within 30 inches  
**Available water capacity:** Mainly 10.0 inches

**Round Butte**
*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
**Dominant parent material:** Lacustrine deposits  
**Native plant cover type:** Rangeland  
**Flooding:** None  
**Available water capacity:** Mainly 5.7 inches

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

**Koyokee Series**

**Depth class:** Very deep  
**Drainage class:** Well drained  
**Permeability:** Slow  
**Landform:** Alluvial fans and stream terraces
Parent material: Tertiary sediments
Slope range: 4 to 30 percent
Elevation: 2,800 to 3,200 feet
Annual precipitation: 14 to 16 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 105 to 115 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Mollic Haploxeralfs

Typical Pedon

Koyokee gravelly loam, 4 to 15 percent slopes, in an area of rangeland, 2,500 feet south and 2,200 feet west of the northeast corner of sec. 31, T. 23 N., R. 23 W.

A—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, and medium and few coarse roots; 20 percent pebbles; neutral; clear wavy boundary.

Bt—3 to 11 inches; light brownish gray (10YR 6/2) very gravelly silty clay, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, firm, very sticky, very plastic; common very fine, fine, and medium and few coarse roots; many prominent clay films on faces of peds; 10 percent cobbles and 35 percent pebbles; neutral; gradual wavy boundary.

Btk—11 to 19 inches; pale brown (10YR 6/3) very cobbly clay loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; hard, firm, very sticky, very plastic; few very fine roots; common distinct clay films on face of peds; 25 percent cobbles and 25 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk—19 to 60 inches; light yellowish brown (10YR 6/4) very cobbly sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 25 percent cobbles and 25 percent pebbles; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 10 to 20 inches

A horizon
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
Reaction: pH 6.6 to 7.3

Bt horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 moist
Chroma: 2, 3, or 4
Texture: Silty clay or silty clay loam
Clay content: 35 to 50 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

Btk horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 3 or 4
Texture: Clay loam or silty clay
Clay content: 35 to 50 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 3 or 4
Texture: Silty clay loam or sandy clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent cobbles; 25 to 35 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

67D—Koyokee gravelly loam, 4 to 15 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Slope: 4 to 15 percent
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 14 to 16 inches
Frost-free period: 105 to 115 days

Composition

Major Components
Koyokee and similar soils: 85 percent
Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Minesinger stony loam: 0 to 5 percent
Minesinger gravelly loam: 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: Tertiary age sediments
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.

67E—Koyoke gravelly loam, 15 to 30 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Position on landform: Dissected or incised treads
Slope: 15 to 30 percent
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 14 to 16 inches
Frost-free period: 105 to 115 days

Composition
Major Components
Koyoke and similar soils: 85 percent

Minor Components
Minesinger stony loam: 0 to 5 percent
Minesinger gravelly loam: 0 to 5 percent
Slopes greater than 30 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: Tertiary age sediments
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.

Krause Series
Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Stream terraces and escarpments
Parent material: Volcanic ash over alluvium
Slope range: 2 to 45 percent
Elevation range: 2,500 to 4,000 feet
Annual precipitation: 17 to 22 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Andic Haplustepts

Typical Pedon
Krause gravelly silt loam, 2 to 8 percent slopes, in an area of forestland, 1,000 feet south and 1,200 feet east of the northwest corner of sec. 19, T. 21 N., R. 25 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
A—0 to 2 inches; dark brown (10YR 3/3) gravelly silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent pebbles; neutral; clear smooth boundary.
Bw—2 to 13 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; moderately acid; clear wavy boundary.
2E/Bw—13 to 31 inches; E part (80 percent) is brown (10YR 5/3) extremely gravelly loamy coarse sand, light gray (10YR 7/2) dry; B part (20 percent) is dark yellowish brown (10YR 4/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky
structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 20 percent cobbles and 45 percent pebbles; slightly acid; gradual wavy boundary.

2C—31 to 60 inches; brown (10YR 5/3) extremely gravelly loamy coarse sand, light gray (10YR 7/2) dry; single grain; loose, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 25 percent cobbles and 55 percent pebbles; moderately acid.

**Range in Characteristics**

**Soil temperature:** 44 to 47 degrees F

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

**A horizon**

- **Value:** 4 or 5 dry
- **Chroma:** 1, 2, or 3
- **Clay content:** 7 to 12 percent
- **Content of rock fragments:** 10 to 60 percent—0 to 10 percent stones; 0 to 20 percent cobbles; 10 to 30 percent pebbles
- **Moist bulk density:** 0.85 to 1.00 g/cm³
- **Acid oxalate extractable Al + 1⁄2 Fe:** 0.4 to 1.0 percent
- **Reaction:** pH 6.1 to 7.3

**Bw horizon**

- **Hue:** 10YR or 7.5YR
- **Value:** 6 or 7 dry
- **Chroma:** 3 or 4
- **Clay content:** 7 to 12 percent
- **Content of rock fragments:** 5 to 50 percent—0 to 20 percent cobbles; 5 to 30 percent pebbles
- **Moist bulk density:** 0.85 to 1.00 g/cm³
- **Acid oxalate extractable Al + 1⁄2 Fe:** 0.4 to 1.0 percent
- **Reaction:** pH 5.6 to 6.5

**2E/Bw horizon**

- **Value:** E part: 6 or 7 dry; B part: 5 or 6 dry
- **Chroma:** E part: 2 or 3; B part: 3 or 4
- **Texture:** Loamy sand, loamy coarse sand, or sandy loam
- **Clay content:** 2 to 10 percent
- **Content of rock fragments:** 50 to 75 percent—5 to 20 percent cobbles; 45 to 60 percent pebbles
- **Reaction:** pH 5.6 to 6.5

**2C horizon**

- **Chroma:** 2 or 3
- **Texture:** Loamy sand, sand, or loamy coarse sand

Clay content: 0 to 5 percent
Content of rock fragments: 50 to 80 percent—5 to 25 percent cobbles; 40 to 60 percent pebbles
Reaction: pH 5.6 to 6.5

**34C—Krause gravelly silt loam, 2 to 8 percent slopes**

**Setting**

- **Landform:** Stream terraces
- **Position on landform:** Treads
- **Slope:** 2 to 8 percent
- **Elevation:** 2,500 to 4,000 feet
- **Mean annual precipitation:** 17 to 19 inches
- **Frost-free period:** 70 to 90 days

**Composition**

**Major Components**

- Krause and similar soils: 90 percent

**Minor Components**

- Slopes greater than 8 percent: 0 to 5 percent
- Krause stony silt loam: 0 to 5 percent

**Major Component Description**

- **Surface layer texture:** Gravelly silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Excessively drained
- **Dominant parent material:** Volcanic ash over alluvium or outwash
- **Native plant cover type:** Forestland
- **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.

**341C—Krause very cobbly silt loam, 2 to 8 percent slopes**

**Setting**

- **Landform:** Stream terraces
- **Position on landform:** Treads
Slope: 2 to 8 percent
Elevation: 3,400 to 3,700 feet
Mean annual precipitation: 20 to 22 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Krause and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Very cobbly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

Lamoose Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate to the 2C horizon; rapid below this depth
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,500 to 4,000 feet
Annual precipitation: 14 to 28 inches
Annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

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

Typical Pedon
Lamoose silt loam, 0 to 2 percent slopes, in an area of pasture, 700 feet north and 1,100 feet west of the southeast corner of sec. 21, T. 18 N., R. 21 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; slightly alkaline; abrupt smooth boundary.

Bg—7 to 20 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; common medium distinct dark yellowish brown (10YR 4/4) moist redox concentrations; weak coarse prismatic structure; slightly hard, friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; disseminated lime; slightly effervescent; slightly alkaline; abrupt smooth boundary.

2C—20 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sand, light brownish gray (10YR 6/2)
moist; single grain; loose, nonsticky, nonplastic; 50 percent pebbles; neutral.

**Range in Characteristics**

- **Soil temperature:** 43 to 47 degrees F
- **Moisture control section:** Between 4 and 12 inches
- **Thickness of the mollic epipedon:** 7 to 10 inches
- **Depth to the 2C horizon:** 14 to 24 inches
- **Depth to the seasonal high water table:** 12 to 24 inches (seasonal high water table at 0 to 12 inches in early spring)

**Ap horizon**
- Value: 2 or 3 moist; 4 or 5 dry
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Reaction: pH 6.6 to 8.4

**Bg horizon**
- Value: 4 or 5 moist; 6 or 7 dry
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Calcium carbonate equivalent: 5 to 10 percent
- Reaction: pH 6.6 to 7.8

**2C horizon**
- Value: 4 or 5 moist; 6 or 7 dry
- Chroma: 1 or 2
- Texture: Loamy sand or sand
- Clay content: 0 to 10 percent
- Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles
- Reaction: pH 6.6 to 7.8

**4A—Lamoose loam, moist, 0 to 2 percent slopes**

**Setting**
- **Landform:** Flood plains
- **Slope:** 0 to 2 percent
- **Elevation:** 3,000 to 4,000 feet
- **Mean annual precipitation:** 20 to 28 inches
- **Frost-free period:** 70 to 90 days

**Composition**

**Major Components**
- Lamoose and similar soils: 85 percent

**Minor Components**
- Somewhat poorly drained soils: 0 to 7 percent
- Areas without flooding: 0 to 5 percent
- Slopes greater than 2 percent: 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:** Forestland
- **Flooding:** Occasional
- **Water table:** Apparent
- **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.

**9A—Lamoose silt loam, 0 to 2 percent slopes**

**Setting**
- **Landform:** Flood plains
- **Slope:** 0 to 2 percent
- **Elevation:** 2,500 to 2,700 feet
- **Mean annual precipitation:** 14 to 16 inches
- **Frost-free period:** 100 to 115 days

**Composition**

**Major Components**
- Lamoose and similar soils: 85 percent

**Minor Components**
- Gardencreek silty clay loam: 0 to 5 percent
- Jocko gravelly loam: 0 to 5 percent
- Slopes greater than 2 percent: 0 to 5 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:** Occasional
- **Water table:** Apparent
- **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.

Larchpoint Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate to 27 inches; rapid below this depth
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 2,200 to 4,200 feet
Annual precipitation: 20 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 105 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, acid, frigid Typic Endoaquents

Typical Pedon

Larchpoint silt loam, 0 to 2 percent slopes, in an area of forestland, 1,800 feet south and 600 feet west of the northeast corner of sec. 3, T. 22 N., R. 31 W.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; soft, friable, nonsticky, nonplastic; many very fine and fine roots; 10 percent pebbles; strongly acid; clear smooth boundary.

C—7 to 15 inches; very dark grayish brown (2.5Y 3/2) silt loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to moderate medium subangular blocky; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; 10 percent pebbles; strongly acid; gradual wavy boundary.

Cg—15 to 27 inches; gray (5Y 5/1) silt loam, light gray (5Y 7/1) dry; massive; soft, friable, nonsticky, nonplastic; common very fine and fine roots; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; 10 percent pebbles; strongly acid; gradual wavy boundary.

2Cg—27 to 31 inches; dark greenish gray (5GY 4/1) loamy coarse sand, light greenish gray (5GY 7/1) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; 10 percent pebbles; strongly acid; gradual wavy boundary.

3Cg—31 to 60 inches; gray (5Y 6/1) very gravelly loamy coarse sand, light gray (5Y 7/1) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; 10 percent cobbles and 40 percent pebbles; strongly acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Depth to the seasonal high water table: 12 to 24 inches

A horizon

Value: 3, 4, or 5 moist; 5, 6, or 7 dry
Clay content: 8 to 18 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 4.5 to 5.5

C horizon

Hue: 2.5Y or 10YR
Value: 3, 4, 5, or 6 moist; 5, 6, or 7 dry
Clay content: 8 to 18 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 4.5 to 5.5

Cg horizon

Hue: 5GY or 5Y
Value: 4 or 5 moist; 6 or 7 dry
Clay content: 8 to 18 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 4.5 to 5.5

2Cg horizon

Hue: 5GY or 5Y
Value: 4 or 5 moist; 6 or 7 dry
Clay content: 2 to 10 percent
Content of rock fragments: 0 to 10 percent pebbles
Reaction: pH 4.5 to 5.5

3Cg horizon

Hue: 5GY or 5Y
Value: 4, 5, or 6 moist; 6 or 7 dry
Clay content: 2 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles, 35 to 45 percent pebbles
Reaction: pH 4.5 to 5.5
**65A—Larchpoint silt loam, 0 to 2 percent slopes**

**Setting**
- **Landform:** Flood plains
- **Slope:** 0 to 2 percent
- **Elevation:** 2,200 to 2,800 feet
- **Mean annual precipitation:** 28 to 34 inches
- **Frost-free period:** 90 to 105 days

**Composition**
- **Major Components:** Larchpoint and similar soils: 85 percent
- **Minor Components:**
  - Oldtrail gravelly sandy loam: 0 to 4 percent
  - Bigbeaver, occasionally flooded: 0 to 4 percent
  - Iffgulch and similar soils: 0 to 4 percent
  - Slopes greater than 2 percent: 0 to 3 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:** Forestland
- **Flooding:** Occasional
- **Water table:** Apparent
- **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.

**Lesier Series**
- **Depth class:** Very deep
- **Drainage class:** Somewhat excessively drained
- **Permeability:** Moderately rapid
- **Landform:** Stream terraces
- **Parent material:** Alluvium
- **Slope range:** 2 to 30 percent
- **Elevation range:** 3,200 to 3,600 feet
- **Annual precipitation:** 26 to 30 inches
- **Annual air temperature:** 40 to 45 degrees F
- **Frost-free period:** 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Eutrudpts

**Typical Pedon**
Lesier gravelly silt loam, 2 to 8 percent slopes, in an area of forestland, 400 feet north and 1,500 feet east of the southwest corner of sec. 23, T. 25 N., R. 27 W.

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

**A—0 to 1 inch; dark brown (10YR 3/3) gravelly silt loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, nonplastic; many fine and medium and few coarse roots; 20 percent pebbles; moderately acid; abrupt wavy boundary.**

**Bw—1 to 10 inches; dark brown (10YR 4/3) gravelly silt loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, nonplastic; many fine and medium and few coarse roots; 20 percent pebbles; moderately acid; abrupt wavy boundary.**

**2E—10 to 17 inches; brown (10YR 5/3) very gravelly sandy loam, very pale brown (10YR 7/3) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine and medium and few coarse roots; 10 percent cobbles and 30 percent pebbles; slightly acid; clear wavy boundary.**

**2Bk1—17 to 34 inches; pale brown (10YR 6/3) very gravelly sandy loam, very pale brown (10YR 8/3) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common medium and coarse roots; 20 percent cobbles and 40 percent pebbles; disseminated lime; common distinct lime coatings on undersides of rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.**

**2Bk2—34 to 60 inches; pale brown (10YR 6/3) extremely cobbly sandy loam, very pale brown (10YR 8/3) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few medium and coarse roots; 30 percent cobbles and 45 percent pebbles; disseminated lime; many distinct lime coatings on undersides of rock fragments; violently effervescent; moderately alkaline.**
Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Depth to the Bk horizon: 13 to 26 inches

A horizon
Value: 3, 4, or 5 dry; 2, 3, or 4 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Moist bulk density: 1.0 to 1.4 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2, 3, or 4 moist
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Moist bulk density: 1.0 to 1.4 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Reaction: pH 5.6 to 6.5

2E horizon
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
Reaction: pH 6.1 to 7.8

2Bk1 horizon
Value: 6, 7, or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 50 to 60 percent—15 to 20 percent cobbles; 35 to 40 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 9.0

2Bk2 horizon
Value: 6, 7, or 8 dry; 5, 6, or 7 moist
Chroma: 2 or 3
Texture: Loamy sand or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 60 to 80 percent—20 to 35 percent cobbles; 40 to 45 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.4 to 9.0

99C—Lesier gravelly silt loam,
2 to 8 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 2 to 8 percent
Elevation: 3,200 to 3,600 feet
Mean annual precipitation: 26 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Lesier and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
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.

99E—Lesier gravelly silt loam,
8 to 30 percent slopes

Setting
Landform: Stream terraces
Position on landform: Risers
Slope: 8 to 30 percent
Elevation: 3,200 to 3,600 feet
Mean annual precipitation: 26 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Lesier and similar soils: 90 percent
Minor Components
Lesier, stony: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
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.

Lionwood Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Lake plains and terraces
Parent material: Volcanic ash over glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation range: 2,300 to 2,800 feet
Annual precipitation: 24 to 28 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 100 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Vitrandic Hapludalfs

Typical Pedon
Lionwood loam, in an area of Lionwood-Scotmont-Whitpeine complex, 4 to 15 percent slopes, in an area of forestland, 1,300 feet south and 2,500 feet east of the northwest corner of sec. 10, T. 22 N., R. 30 W.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; moderately acid; clear wavy boundary.

E1—5 to 17 inches; brown (10YR 5/3) loam, pale brown (10YR 6/3) dry; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; moderately acid; gradual wavy boundary.
E2—17 to 26 inches; brown (10YR 5/3) very fine sandy loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; moderately acid; abrupt wavy boundary.
Bt and E—26 to 47 inches; B part (60 percent) is yellowish brown (10YR 5/4) 1/2- to 2-inch thick fine sandy loam lamellae, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; many distinct clay films bridging sand grains; moderately acid; E part (40 percent) is very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; common fine, medium, and coarse roots; moderately acid; abrupt wavy boundary.

2Bt—47 to 52 inches; light yellowish brown (10YR 6/4) clay, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine, medium, and coarse roots; many distinct clay films on faces of peds; moderately acid; abrupt wavy boundary.
3Bt and E—52 to 60 inches; B part (60 percent) is yellowish brown (10YR 5/4) 1- to 3-inch thick fine sandy loam lamellae, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; many distinct clay films bridging sand grains; slightly acid. E part (40 percent) is brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; moderately acid.

Range in Characteristics
Soil temperature: 44 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the 2Bt horizon: Greater than 40 inches
A horizon
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 8 to 15 percent
Moist bulk density: 1.0 to 1.40 g/cm³
Acid oxalate extractable Al + ½ Fe: 0.4 to 1.0 percent
Reaction: pH 5.1 to 6.5

**E horizons**
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Texture: Loam or very fine sandy loam
Clay content: 5 to 15 percent
Moist bulk density: 1.0 to 1.40 g/cm³
Acid oxalate extractable Al + ½ Fe: 0.4 to 1.0 percent
Reaction: pH 5.1 to 6.5

**Bt and E horizon**
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: B part: 10 to 20 percent; E part: 2 to 10 percent
Reaction: pH 5.6 to 6.5

**2Bt horizon**
Hue: 10YR, 7.5YR, or 5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: 40 to 50 percent
Reaction: pH 5.6 to 7.3

**3Bt and E horizon**
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Clay content: B part: 10 to 20 percent; E part: 8 to 15 percent
Reaction: pH 5.6 to 7.3

**64B—Lionwood loam, 0 to 4 percent slopes**

**Setting**
Landform: Lake plains or terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 100 to 115 days

**Composition**
Major Components
Lionwood and similar soils: 85 percent

Minor Components
Scotmont fine sandy loam: 0 to 7 percent
Whitepine silt loam: 0 to 6 percent
Slopes greater than 4 percent: 0 to 2 percent

**Major Component Description**
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)

**Drainage class**: Well drained
**Dominant parent material**: Volcanic ash over glaciolacustrine
**Native plant cover type**: Forestland
**Flooding**: None
**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.

**641D—Lionwood-Scotmont-Whitepine complex, 4 to 15 percent slopes**

**Setting**

**Landform**:
• Lionwood—Lake plains or terraces
• Scotmont—Lake plains or terraces
• Whitepine—Lake plains or terraces

**Position on landform**:
• Lionwood—Treads
• Scotmont—Treads
• Whitepine—Treads

**Slope**:
• Lionwood—4 to 15 percent
• Scotmont—4 to 15 percent
• Whitepine—4 to 15 percent

**Elevation**: 2,300 to 2,800 feet
**Mean annual precipitation**: 24 to 28 inches
**Frost-free period**: 100 to 115 days

**Composition**

**Major Components**
Lionwood and similar soils: 45 percent
Scotmont and similar soils: 30 percent
Whitepine and similar soils: 15 percent

**Minor Components**
Slopes greater than 15 percent: 0 to 2 percent
Slopes less than 4 percent: 0 to 2 percent
Fernline silt loam: 0 to 2 percent
Bonnash gravelly silt loam: 0 to 2 percent
Iffgulch and similar soils: 0 to 2 percent

**Major Component Description**

**Lionwood**
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 8.6 inches

Scotmont
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.1 inches

Whitepine
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 9.5 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.

Composition

Major Components
Lionwood and similar soils: 40 percent
Scotmont and similar soils: 35 percent
Whitepine and similar soils: 15 percent

Minor Components
Slopes greater than 35 percent: 0 to 2 percent
Slopes less than 15 percent: 0 to 2 percent
Fernline silt loam: 0 to 2 percent
Bonnash gravelly silt loam: 0 to 2 percent
Iffgulch and similar soils: 0 to 2 percent

Major Component Description

Lionwood
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 8.6 inches

Scotmont
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.1 inches

Whitepine
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 9.5 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.

641E—Lionwood-Scotmont-Whitepine complex, 15 to 35 percent slopes

Setting

Landform:
- Lionwood—Lake plains or terraces
- Scotmont—Lake plains or terraces
- Whitepine—Lake plains or terraces

Position on landform:
- Lionwood—Dissected or incised treads
- Scotmont—Dissected or incised treads
- Whitepine—Dissected or incised treads

Slope:
- Lionwood—15 to 35 percent
- Scotmont—15 to 35 percent
- Whitepine—15 to 35 percent

Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 100 to 115 days

Loneman Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Volcanic ash over colluvium
Slope range: 15 to 60 percent
Elevation range: 3,600 to 4,600 feet
Annual precipitation: 28 to 32 inches
Annual air temperature: 39 to 44 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Paleudalfs

**Typical Pedon**

Loneman silt loam, 35 to 60 percent slopes, in an area of forestland, 2,200 feet north and 1,500 feet east of the southwest corner of sec. 33, T. 22 N., R. 26 W.

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

A—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine and fine and few medium roots; 10 percent pebbles; neutral; abrupt wavy boundary.

Bw—1 to 9 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine and fine and few medium roots; 10 percent pebbles; neutral; abrupt wavy boundary.

2E—9 to 26 inches; grayish brown (2.5Y 5/2) very gravelly loam, light brownish gray (2.5Y 6/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; common very fine and fine and few medium and coarse roots; 10 percent cobbles and 40 percent pebbles; neutral; abrupt wavy boundary.

2E/Bt—26 to 40 inches; E part (70 percent) very pale brown (10YR 7/3) very gravelly loam, very pale brown (10YR 8/3) dry; B part (30 percent) yellowish brown (10YR 4/4) very gravelly clay loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and medium and common coarse roots; common distinct clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; neutral; gradual wavy boundary.

2Bt—40 to 60 inches; yellowish brown (10YR 5/6) very gravelly clay loam, brownish yellow (10YR 6/6) dry; moderate medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; common medium and coarse roots; many distinct clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; neutral.

**Range in Characteristics**

Soil temperature: 40 to 45 degrees F
Moisture control section: Between 4 and 12 inches

A horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + ¹/₂ Fe: 1.0 to 1.5 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.6 to 7.3

Bw horizon
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 4 or 6
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + ¹/₂ Fe: 1.0 to 1.5 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Reaction: pH 5.6 to 7.3

2E horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2, 3, or 4
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bt horizon
Hue: E part: 7.5YR, 10YR, or 2.5Y; B part: 7.5YR or 10YR
Value: E part: 6, 7, or 8 dry, 5, 6, or 7 moist; B part: 6 or 7 dry, 4, 5, or 6 moist
Chroma: E part: 3, 4, 6, or 8; B part: 4 or 6
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent pebbles
Reaction: pH 5.6 to 7.3

2Bt horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 6 or 8
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 50 percent—
10 to 20 percent cobbles; 25 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

884E—Loneman silt loam,
15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 3,600 to 4,600 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Loneman and similar soils: 85 percent

Minor Components
Bignell gravelly loam: 0 to 4 percent
Slopes greater than 35 percent: 0 to 4 percent
Sharrott gravelly loam, cool: 0 to 3 percent
Loneman silt loam, stony: 0 to 2 percent
Loneman silt loam, bouldery: 0 to 2 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
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.

884F—Loneman silt loam,
35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,600 to 4,600 feet

Mean annual precipitation: 28 to 32 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Loneman and similar soils: 85 percent

Minor Components
Slopes greater than 60 percent: 0 to 4 percent
Bignell gravelly loam: 0 to 4 percent
Sharrott gravelly loam, cool: 0 to 3 percent
Loneman silt loam, stony: 0 to 2 percent
Loneman silt loam, bouldery: 0 to 2 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
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.

Lonepine Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 2 to 20 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Fine-silty, mixed, active, frigid
Calcic Haploxerepts

Typical Pedon
Lonepine silt loam, 2 to 8 percent slopes, in an area of cropland, 100 feet south and 2,600 feet west of the northeast corner of sec. 25, T. 21 N., R. 21 W. (Lake County, Montana)
Ap—0 to 6 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak
fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; common very fine roots; few very fine pores; neutral (pH 7.0); abrupt wavy boundary. (4- to 10-inches thick)

Bw—6 to 14 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; neutral (pH 7.2); abrupt wavy boundary. (3- to 12-inches thick)

Bk—14 to 19 inches; white (10YR 8/2) silt loam, brown (10YR 5/3) moist; moderate medium platy structure of varve remnants; hard, very friable, slightly sticky, slightly plastic; few roots and pores; disseminated lime and common medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual irregular boundary (4- to 10-inches thick).

C—19 to 60 inches; white (10YR 8/2) silt loam, pale brown (10YR 6/3) moist; massive, consisting of 1/4- to 1/2-inch thick varves; very friable, slightly sticky, slightly plastic; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 11 to 20 inches
Depth to the varves: 18 to 40 inches

Ap horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 12 to 25 percent
Reaction: pH 6.6 to 7.3

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.6 to 7.3

Bk horizon
Hue: 10YR or 2.5Y
Value: 6, 7, or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.9 to 8.4

C horizon
Hue: 10YR or 2.5Y
Value: 6, 7, or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 8.4

15B—Lonepine silt loam, 2 to 8 percent slopes

Setting

Landform: Lake plains or terraces
Slope: 2 to 8 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Lonepine and similar soils: 85 percent

Minor Components
Round Butte silty clay loam: 0 to 4 percent
Slopes greater than 8 percent: 0 to 4 percent
Vincom silt loam: 0 to 4 percent
Gardencreek silty clay loam: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 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.
15D—Lonepine-Vincom silt loams, 4 to 15 percent slopes

Setting

Landform:
• Lonepine—Lake plains or terraces
• Vincom—Lake plains or terraces

Position on landform:
• Lonepine—Dissected or incised treads
• Vincom—Dissected or incised treads

Slope:
• Lonepine—4 to 15 percent
• Vincom—8 to 15 percent

Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Lonepine and similar soils: 60 percent
Vincom and similar soils: 25 percent

Minor Components
Round Butte silty clay loam: 0 to 5 percent
Dryfork silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description

Lonepine
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

Vincom
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
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.

215B—Lonepine-Round Butte complex, 2 to 8 percent slopes

Setting

Landform:
• Lonepine—Lake plains or terraces
• Round Butte—Lake plains or terraces

Slope:
• Lonepine—2 to 8 percent
• Round Butte—2 to 8 percent

Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Lonepine and similar soils: 50 percent
Round Butte and similar soils: 35 percent

Minor Components
Vincom silt loam: 0 to 6 percent
Slopes greater than 8 percent: 0 to 6 percent
Sonyok silty clay loam: 0 to 3 percent

Major Component Description

Lonepine
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

Round Butte
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.1 inches
Sodium affected: Sodic within 30 inches
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.

Loonlake Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces and outwash plains
Parent material: Volcanic ash over alluvium or outwash
Slope range: 4 to 30 percent
Elevation range: 3,300 to 3,800 feet
Annual precipitation: 24 to 30 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Paleudalfs

Typical Pedon
Loonlake gravelly silt loam, 4 to 15 percent slopes, in an area of forestland, 1,800 feet north and 700 feet west of the southeast corner of sec. 22, T. 27 N., R. 28 W.

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

Bw—0 to 9 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 15 percent pebbles; moderately acid; clear wavy boundary.

2E—9 to 24 inches; brown (10YR 5/3) very gravelly sandy loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine and medium and few coarse roots; 10 percent cobbles and 35 percent pebbles; moderately acid; gradual wavy boundary.

2E/Bt—24 to 36 inches; E part (80 percent) is brown (10YR 5/3) extremely cobbly sandy clay loam, very pale brown (10YR 7/3) dry; B part (20 percent) is dark brown (10YR 4/3) extremely cobbly sandy clay loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 30 percent cobbles and 40 percent pebbles; moderately acid; gradual wavy boundary.

2Bt—36 to 60 inches; dark brown (10YR 4/3) very gravelly sandy clay loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common medium and few coarse roots; continuous faint clay films on faces of peds; 1 percent cobbles and 40 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the 2Bt horizon: 27 to 38 inches

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 5 to 15 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Acid oxalate extractable Al + ½ Fe: 1.0 to 1.2 percent
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 5.6 to 7.3

2E horizon
Value: 6 or 7 dry; 5 or 6 moist
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 50 percent—5 to 15 percent cobbles; 30 to 35 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bt horizon
Value: 6 or 7 dry; 4 or 5 moist
Clay content, mixed: 5 to 15 percent
Content of rock fragments: 60 to 80 percent—20 to 35 percent cobbles; 40 to 45 percent pebbles
Reaction: pH 5.6 to 7.3

2Bt horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 20 to 30 percent
Content of rock fragments: 45 to 60 percent—10 to 20 percent cobbles; 35 to 40 percent pebbles
Reaction: pH 5.6 to 7.3
71D—Loonlake gravelly silt loam,  
4 to 15 percent slopes

Setting
Landform: Stream terraces and outwash plains
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Loonlake and similar soils: 90 percent
Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 15 percent: 0 to 3 percent
Slopes less than 4 percent: 0 to 2 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

71E—Loonlake gravelly silt loam,  
15 to 30 percent slopes

Setting
Landform: Stream terraces and outwash plains
Position on landform: Risers
Slope: 15 to 30 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Loonlake and similar soils: 90 percent
Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 30 percent: 0 to 3 percent
Slopes less than 15 percent: 0 to 2 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
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.

Lozeau Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Mountains
Parent material: Colluvium and residuum derived from semiconsolidated welded tuff
Slope range: 8 to 50 percent
Elevation: 3,000 to 3,700 feet
Annual precipitation: 22 to 24 inches
Annual air temperature: 39 to 42 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Fine-loamy, mixed, active, frigid
Glossic Hapludalfs

Typical Pedon
Lozeau gravelly loam, 8 to 30 percent slopes, in an area of forestland, 3,450 feet north and 2,600 feet east of the southwest corner of sec. 5, T. 24 N., R. 24 W.
Oi—1 inch to 0; undecomposed and partially decomposed forest litter.
A—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; 20 percent pebbles; moderately acid; clear smooth boundary.

E/Bw—3 to 16 inches; E part (65 percent) is light brownish gray (10YR 6/2) gravelly loam, grayish brown (10YR 5/2) moist; B part (35 percent) is pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine and common fine and medium roots; few fine and medium tubular pores; 20 percent pebbles; moderately acid; clear smooth boundary.

Bt/E—16 to 32 inches; B part (65 percent) is light yellowish brown (10YR 6/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; E part (35 percent) is very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; few fine and common medium roots; common fine tubular pores; common faint clay films on faces of peds and lining pores; 5 percent cobbles, 15 percent pebbles, and 15 percent soft fragments; slightly acid; gradual smooth boundary.

Cr—32 to 60 inches; semiconsolidated welded tuff.

Range in Characteristics

Soil temperature: 41 to 43 degrees F
Moisture control section: Between 4 and 12 inches
Depth to semiconsolidated welded tuff: 20 to 40 inches
Notes: Some profiles may contain an E and/or BC horizon. When mixed to 7 inches, the surface layer fails to meet the requirements of a mollic epipedon.

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 10 to 35 percent—
15 to 30 percent pebbles; 0 to 5 percent cobbles
Reaction: pH 5.6 to 6.5

E/Bw horizon
Hue: 10YR or 2.5Y
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: E part: 2 or 3; B part: 3 or 4
Clay content: 10 to 27 percent
Content of rock fragments: 10 to 27 percent—
10 to 30 percent pebbles; 0 to 5 percent cobbles
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 or 7 dry, 5 or 6 moist
Chroma: B part: 3, 4, or 6; E part: 2 or 3
Texture: Loam, clay loam, or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 5 to 60 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles; 0 to 25 percent soft fragments
Reaction: pH 5.6 to 6.5

Cr horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry, 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 5 to 30 percent—
5 percent cobbles; 5 to 30 percent pebbles; 0 to 25 percent soft fragments
Reaction: pH 5.6 to 6.5

84E—Lozeau gravelly loam, 8 to 30 percent slopes

Setting
Landform: Mountains
Slope: 8 to 30 percent
Elevation: 3,000 to 3,700 feet
Mean annual precipitation: 22 to 24 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Lozeau and similar soils: 85 percent

Minor Components
Pashua gravelly loam: 0 to 5 percent
Areas of welded tuff outcrop: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Forestland
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.
84F—Lozeau gravelly loam, 30 to 50 percent slopes

**Setting**

*Landform:* Mountains  
*Slope:* 30 to 50 percent  
*Elevation:* 3,000 to 3,700 feet  
*Mean annual precipitation:* 22 to 24 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Lozeau and similar soils: 85 percent

**Minor Components**
Pashua gravelly loam: 0 to 5 percent  
Areas of welded tuff outcrop: 0 to 5 percent  
Slopes greater than 50 percent: 0 to 3 percent  
Slopes less than 30 percent: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Tuff residuum  
*Native plant cover type:* Forestland  
*Floodling:* 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.

**Marklepass Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Very slow  
*Landform:* Lake plains and terraces  
*Parent material:* Lacustrine deposits  
*Slope range:* 0 to 4 percent  
*Elevation:* 2,500 to 3,000 feet  
*Annual precipitation:* 12 to 14 inches  
*Frost-free period:* 105 to 125 days

*Taxonomic Class:* Fine, mixed, superactive, frigid  
Typic Natrixeralfs

**Typical Pedon**

Marklepass silty clay loam (mixed), in an area of Marklepass-Slickspots complex, 0 to 4 percent slopes, in an area of rangeland, 1,850 feet north and 360 feet east of the southwest corner of sec. 25, T. 23 N., R. 24 W.

A1—0 to 1 inch; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong fine and medium granular structure; slightly hard, firm, moderately sticky, slightly plastic; common fine and few medium roots; slightly effervescent; very strongly alkaline; clear smooth boundary.

A2—1 to 7 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium angular blocky structure; slightly hard, firm, moderately sticky, slightly plastic; common fine and few medium roots; slightly effervescent; very strongly alkaline; clear smooth boundary.

Btn1—7 to 15 inches; light grayish brown (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, moderately plastic; common fine and few medium roots; many distinct clay films on faces of peds; slightly effervescent; very strongly alkaline; clear smooth boundary.

Btn2—15 to 24 inches; light yellowish brown (2.5Y 6/4) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium angular blocky structure; very hard, very firm, very sticky, moderately plastic; few fine roots; many distinct clay films on faces of peds; slightly effervescent; very strongly alkaline; clear smooth boundary.

Bkn—24 to 60 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard; friable; slightly sticky, slightly plastic; few fine roots; few fine threads of lime; strongly effervescent; very strongly alkaline.

**Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bkn horizon:* 10 to 25 inches

**A1 horizon**

*Hue:* 10YR or 2.5Y  
*Value:* 5, 6, or 7 dry; 4, 5, or 6 moist  
*Chroma:* 2 or 3  
*Clay content:* 18 to 27 percent  
*Electrical conductivity (mmhos/cm):* 0 to 4
Sodium adsorption ratio: 13 to 40
Reaction: pH 8.5 to 9.6

**A2 horizon**
- Hue: 2.5Y or 10YR
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Clay content: 27 to 40 percent
- Electrical conductivity (mmhos/cm): 0 to 4
- Sodium adsorption ratio: 40 to 75
- Reaction: pH 8.5 to 9.6

**Btn horizons**
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 2, 3, or 4
- Texture: Silty clay loam or silty clay
- Clay content: 35 to 50 percent
- Electrical conductivity (mmhos/cm): 0 to 4
- Sodium adsorption ratio: 45 to 120
- Reaction: pH 8.5 to 9.6

**Bkn horizon**
- Hue: 10YR or 2.5Y
- Value: 6, 7, or 8 dry; 5, 6, or 7 moist
- Chroma: 2, 3, or 4
- Texture: Silty clay loam or silty clay
- Clay content: 35 to 50 percent
- Calcium carbonate equivalent: 5 to 10 percent
- Electrical conductivity (mmhos/cm): 2 to 8
- Sodium adsorption ratio: 45 to 120
- Reaction: pH 8.5 to 9.6

**12A—Marklepass silty clay loam, 0 to 2 percent slopes**

**Setting**
- Landform: Lake plains or terraces
- Slope: 0 to 2 percent
- Elevation: 2,500 to 3,000 feet
- Mean annual precipitation: 12 to 14 inches
- Frost-free period: 105 to 125 days

**Composition**
- Major Components
  - Marklepass and similar soils: 85 percent
- Minor Components
  - Areas of slickspots: 0 to 4 percent
  - Round Butte silty clay loam: 0 to 4 percent
  - Slopes greater than 2 percent: 0 to 4 percent
  - Bohnly silt loam: 0 to 3 percent

**Major Component Description**
- Surface layer texture: Silty clay loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Lacustrine deposits
- Native plant cover type: Rangeland
- Flooding: None
- Sodium affected: Sodic within 30 inches
- 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.

**112A—Marklepass-Slickspots complex, 0 to 4 percent slopes**

**Setting**
- Landform: Lake plains or terraces
- Slope: 0 to 4 percent
- Elevation: 2,500 to 3,000 feet
- Mean annual precipitation: 12 to 14 inches
- Frost-free period: 105 to 125 days

**Composition**
- Major Components
  - Marklepass and similar soils: 55 percent
  - Areas of slickspots: 30 percent
- Minor Components
  - Slopes greater than 4 percent: 0 to 5 percent
  - Round Butte silty clay loam: 0 to 5 percent
  - Bohnly silt loam: 0 to 5 percent

**Major Component Description**
- Surface layer texture: Silty clay loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Lacustrine deposits
- Native plant cover type: Rangeland
- Flooding: None
- Sodium affected: Sodic within 30 inches
- Available water capacity: Mainly 4.7 inches
Slickspots
Definition: Areas of loamy or clayey soil with excess exchangeable sodium and low productivity.

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

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

McCollum Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Elevation: 2,400 to 3,000 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Typic Haploxerolls

Typical Pedon

McCollum fine sandy loam, 0 to 4 percent slopes, in an area of hayland, 1,500 feet north and 2,600 feet east of the southwest corner of sec. 9, T. 18 N., R. 25 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; neutral; clear wavy boundary.

Bw—10 to 21 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; neutral; clear wavy boundary.

C—21 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap horizon
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 8 to 18 percent
Reaction: pH 6.1 to 7.3

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 8 to 18 percent
Reaction: pH 6.1 to 7.3

C horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Fine sandy loam or loamy fine sand
Clay content: 8 to 18 percent
Reaction: pH 6.6 to 7.8

35C—McCollum fine sandy loam, 4 to 8 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 8 percent
Elevation: 2,400 to 2,600 feet
Mean annual precipitation: 16 to 19 inches
Frost-free period: 105 to 125 days

Composition

Major Components
McCollum and similar soils: 85 percent

Minor Components
Grantsdale silt loam: 0 to 3 percent
Sacheen loamy fine sand: 0 to 3 percent
Slopes greater than 8 percent: 0 to 3 percent
Horseplains, occasionally flooded: 0 to 2 percent
Gird silt loam: 0 to 2 percent
Slopes less than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Fine 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 7.8 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.

292B—McCollum fine sandy loam,
0 to 4 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,400 to 3,000 feet
Mean annual precipitation: 15 to 17 inches
Frost-free period: 105 to 125 days

Composition
Major Components
McCollum and similar soils: 85 percent

Minor Components
Grantsdale silt loam: 0 to 5 percent
Gird silt loam: 0 to 3 percent
Sacheen loamy fine sand: 0 to 3 percent
Slopes greater than 4 percent: 0 to 3 percent
Horsetrails, occasionally flooded: 0 to 1 percent

Major Component Description

McCollum
Surface layer texture: Fine 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 7.8 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.

351C—McCollum-Belton fine sandy loams, 4 to 8 percent slopes

Setting

Landform:
• McCollum—Stream terraces
• Belton—Stream terraces

Position on landform:
• McCollum—Treads
• Belton—Treads

Slope:
• McCollum—4 to 8 percent
• Belton—4 to 8 percent

Elevation: 2,600 to 3,000 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 105 to 125 days

Composition

Major Components
McCollum and similar soils: 45 percent
Belton and similar soils: 40 percent

Minor Components
Bemishave loam: 0 to 5 percent
Gird silt loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

Major Component Description

McCollum
Surface layer texture: Fine 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 7.8 inches

Belton
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.2 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.

351D—McCollum-Belton fine sandy loams, 8 to 15 percent slopes

Setting

Landform:
- McCollum—Stream terraces
- Belton—Stream terraces

Position on landform:
- McCollum—Dissected or incised treads
- Belton—Dissected or incised treads

Slope:
- McCollum—8 to 15 percent
- Belton—8 to 15 percent

Elevation: 2,600 to 3,000 feet

Mean annual precipitation: 17 to 19 inches

Frost-free period: 105 to 125 days

Composition

Major Components
McCollum and similar soils: 65 percent
Belton and similar soils: 20 percent

Minor Components
Bemishave loam: 0 to 5 percent
Gird silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description

McCollum
Surface layer texture: Fine 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 7.8 inches

Belton
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.2 inches

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

McDonald Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow

Landform: Alluvial fans, stream terraces, and hills
Parent material: Tertiary sediments
Slope range: 2 to 30 percent
Elevation: 3,300 to 4,800 feet
Annual precipitation: 17 to 19 inches
Annual air temperature: 39 to 44 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Fine, illitic, frigid Alfic Argixerolls

Typical Pedon

McDonald silt loam, 8 to 15 percent slopes, in an area of rangeland, 1,700 feet south and 1,700 feet east of the northwest corner of sec. 10, T. 17 N., R. 21 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; 5 percent pebbles; neutral; clear smooth boundary.

E—10 to 13 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—13 to 20 inches; light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; many distinct clay films on faces of peds; 5 percent pebbles; neutral; gradual wavy boundary.

Bt2—20 to 34 inches; pale yellow (2.5Y 7/4) silt clay loam, light yellowish brown (2.5Y 6/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; common distinct clay films on faces of peds; 5 percent pebbles; neutral; gradual wavy boundary.

Bk—34 to 60 inches; white (2.5Y 8/2) gravelly silt clay loam, light brownish gray (2.5Y 6/2) moist; weak fine subangular blocky structure; slightly
hard, very friable, slightly sticky, slightly plastic; few faint clay films on faces of peds; 20 percent pebbles; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 46 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 10 to 16 inches
Depth to the Bk horizon: 24 to 40 inches

Ap horizon
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 18 to 27 percent
Content of rock fragments: 5 to 15 percent—0 to 2 percent stones; 0 to 3 percent cobbles; 5 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

E horizon
Clay content: 20 to 27 percent
Content of rock fragments: 5 to 15 percent—0 to 2 percent stones; 0 to 3 percent cobbles; 5 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizons
Hue: 2.5Y or 10YR
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2, 3, or 4
Texture: Clay, silty clay, or silty clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 20 percent pebbles
Reaction: pH 6.6 to 7.3

Bk horizons
Hue: 2.5Y or 10YR
Value: 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2, 3, or 4
Texture: Silty clay loam or clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 20 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

58B—McDonald silt loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Position on landform: Footslopes and toeslopes
Slope: 2 to 8 percent
Elevation: 3,300 to 4,800 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components
McDonald and similar soils: 85 percent

Minor Components
Minesinger gravelly loam: 0 to 9 percent
Slopes greater than 8 percent: 0 to 6 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Tertiary age sediments
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.4 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.

58D—McDonald silt loam, 8 to 15 percent slopes

Setting

Landform: Hills
Position on landform: Backslopes, footslopes, and side slopes
Slope: 8 to 15 percent
Elevation: 3,300 to 4,800 feet
Mean annual precipitation: 17 to 19 inches  
Frost-free period: 90 to 110 days

**Composition**

**Major Components**
McDonald and similar soils: 85 percent

**Minor Components**
Minesinger gravelly loam: 0 to 9 percent  
Slopes greater than 15 percent: 0 to 6 percent

**Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Tertiary age sediments  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.4 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.

**McLangor Series**

*Depth class:* Very deep  
*Drainage class:* Very poorly drained  
*Permeability:* Moderate  
*Landform:* Flood plains and closed depressions  
*Parent material:* Organic materials over alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 2,400 to 3,800 feet  
*Annual precipitation:* 12 to 30 inches  
*Annual air temperature:* 40 to 43 degrees F  
*Frost-free period:* 70 to 110 days

**Taxonomic Class:** Loamy, mixed, euic, frigid Terric Haplohemists

**Typical Pedon**

McLangor mucky peat, 0 to 2 percent slopes, in an area of wet meadow hayland, 1,900 feet north and 300 feet east of the southwest corner of sec. 33, T. 26 N., R. 26 W.

*Oe1*—0 to 8 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); 70 percent fiber and raw herbaceous plant material—30 percent rubbed; massive; nonsticky nonplastic; herbaceous fiber, mostly residue from Phragmites arundinacea; many very fine and fine roots; slightly acid; gradual smooth boundary.

*Oe2*—8 to 17 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); 50 percent fiber—20 percent rubbed; massive; nonsticky nonplastic; herbaceous fiber; common very fine and fine roots; slightly acid; clear smooth boundary.

*C1*—17 to 20 inches; stratified (1/4 to 1/2 inch) very dark gray (10YR 3/1) mucky silt loam (50 percent), dark gray (10YR 4/1) silt loam (40 percent), and black (10YR 2/1) mucky silt loam (10 percent); massive; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; neutral; abrupt smooth boundary.

*C2*—20 to 36 inches; stratified (1/4 to 1/2 inch) light gray (10YR 7/2) silt and very fine sandy loam; massive; soft, very friable, nonsticky, nonplastic;
common very fine and fine roots; neutral; abrupt wavy boundary.

C3—36 to 42 inches; stratified (1/4 to 3/4 inch) very dark gray (10YR 3/1) mucky silt loam (60 percent), dark gray (10YR 4/1) silt loam (30 percent), and black (10YR 2/1) mucky peat (10 percent); massive; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; slightly acid; clear wavy boundary.

Oa—42 to 54 inches; black (10YR 2/1) broken face and rubbed muck (sapric material); 30 percent fiber—5 percent rubbed; massive; nonsticky nonplastic; herbaceous fiber; common very fine and fine roots; moderately acid; abrupt wavy boundary.

Cg—54 to 60 inches; stratified (1/4 to 1/2 inch) light gray (5Y 6/1) silt and silt loam; massive; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; moderately acid.

Range in Characteristics

Soil temperature: 42 to 45 degrees F
Thickness of organic material: Less than 51 inches
Depth to the seasonal high water table: 0 to 12 inches
Depth to the C horizon: 16 to 34 inches
Depth to the Cg horizon: 38 to 54 inches

Notes: Some pedons have an Oe3 horizon. The combined thickness of the Oe1, Oe2, and Oe3 (if present) horizons is 16 to 34 inches. An Oe’ horizon is present in some pedons in place of the Oa horizon.

Oe1 and Oe2 horizons
Value: 2 or 3
Chroma: 1 or 2
Fiber content, unrubbed: 40 to 70 percent
Fiber content, rubbed: 20 to 30 percent
Reaction: pH 5.6 to 6.5

C1 horizon
Value: 2, 3, or 4
Chroma: 1 or 2
Texture: Silt loam or mucky silt loam
Clay content: 5 to 15 percent
Reaction: pH 5.6 to 7.3

C2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 7 or 8
Chroma: 1 or 2
Texture: Stratified silt, very fine sandy loam, loamy very fine sand, or silt loam; averaging less than 15 percent fine sand or coarser
Clay content: 4 to 12 percent
Reaction: pH 5.6 to 7.3

C3 horizon
Value: 2, 3, or 4
Chroma: 1 or 2
Texture: Mucky silt loam or silt loam
Clay content: 5 to 15 percent
Reaction: pH 5.6 to 6.5

Oa horizon
Value: 2 or 3
Fiber content, unrubbed: 20 to 30 percent
Fiber content, rubbed: 5 to 15 percent
Reaction: pH 5.6 to 6.5

Cg horizon
Hue: 5Y, 5GY, 5G, or 5BG
Value: 5, 6, or 7
Chroma: 1 or 2
Texture: Stratified silt, silt loam, very fine sandy loam, loamy very fine sand, or very fine sand; averaging less than 15 percent fine sand or coarser
Clay content: 4 to 15 percent
Reaction: pH 5.6 to 6.5

99A—McLangor-Meadowpeak complex, 0 to 2 percent slopes

Setting

Landform:
• McLangor—Closed depressions
• Meadowpeak—Closed depressions
Slope:
• McLangor—0 to 2 percent
• Meadowpeak—0 to 2 percent
Elevation: 2,400 to 3,200 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 90 to 110 days

Composition

Major Components
McLangor and similar soils: 45 percent
Meadowpeak and similar soils: 40 percent

Minor Components
Slopes greater than 2 percent: 0 to 10 percent
Areas of open water: 0 to 5 percent

Major Component Description

McLangor
Surface layer texture: Mucky-peat
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Organic deposits
Native plant cover type: Rangeland
Flooding: Frequent
Water table: Apparent
Available water capacity: Mainly 16.0 inches

Meadowpeak
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: Frequent
Water table: Apparent
Available water capacity: Mainly 10.1 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.

Meadowpass Series
Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Hills
Parent material: Colluvium and residuum derived from semiconsolidated welded tuff
Slope range: 2 to 8 percent
Elevation: 3,200 to 3,800 feet
Annual precipitation: 16 to 18 inches
Average air temperature: 39 to 42 degrees F
Frost-free period: 100 to 110 days

Taxonomic Class: Fine, mixed, active, frigid Typic Argixerolls

Typical Pedon
Meadowpass gravelly loam, 2 to 8 percent slopes, in an area of rangeland, 900 feet north and 2,900 feet east of the southwest corner of sec. 11, T. 24 N., R. 24 W.

A1—0 to 3 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium and coarse roots; 15 percent pebbles; slightly acid; clear smooth boundary.

A2—3 to 9 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine and few medium and coarse roots; few fine tubular pores; 5 percent cobbles and 15 percent pebbles; slightly acid; clear smooth boundary.

Bt1—9 to 12 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, moderately plastic; many very fine and fine and few medium roots; common fine tubular
pores; few faint clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly acid; clear smooth boundary.

Bt2—12 to 18 inches; pale brown (10YR 6/3) sandy clay, brown (10YR 4/3) moist; weak coarse prismatic structure parting to strong medium angular blocky; hard, firm, moderately sticky, very plastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular pores; common prominent clay films on faces of peds and in pores; 10 percent pebbles and 15 percent soft fragments; neutral; gradual smooth boundary.

Bt/C—18 to 30 inches; B part (60 percent) is light olive brown (2.5Y 5/4) sandy clay, olive brown (2.5Y 4/4) moist; C part (40 percent) is pale yellow (2.5Y 7/4) sandy clay loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure; slightly hard, firm, moderately sticky, very plastic; few very fine and fine roots along prism faces; few tubular and interstitial pores; common distinct clay films on faces of peds; 10 percent pebbles and 40 percent soft fragments; neutral; gradual smooth boundary.

Cr—30 to 60 inches; semiconsolidated welded tuff.

Range in Characteristics

Soil temperature: 41 to 44 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Cr horizon: 20 to 40 inches

A horizons
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 15 to 27 percent
Content of rock fragments: 15 to 45 percent—0 to 10 percent cobbles; 15 to 35 percent pebbles
Reaction: pH 6.1 to 7.3

Bt1 horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Content of rock fragments: 10 to 45 percent—0 to 5 percent cobbles; 10 to 30 percent pebbles; 0 to 10 percent soft fragments
Reaction: pH 6.1 to 7.3

Bt2 horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Sandy clay or clay
Clay content: 35 to 60 percent

Content of rock fragments: 15 to 50 percent—5 to 25 percent pebbles; 10 to 25 percent soft fragments
Reaction: pH 6.1 to 7.3

Bt/C horizon
Hue: 10YR or 2.5Y
Value: B part: 5 or 6 dry, 4 or 5 moist; C part: 6 or 7 dry, 5 or 6 moist
Chroma: B part: 3, 4, or 6; C part: 3 or 4
Texture: Sandy clay or sandy clay loam
Clay content: 30 to 50 percent
Content of rock fragments: 10 to 70 percent—5 to 25 percent pebbles; 5 to 45 percent soft fragments
Reaction: pH 6.1 to 7.3

69B—Meadowpass gravelly loam, 2 to 8 percent slopes

Setting

Landform: Hills
Position on landform: Summits of hills
Slope: 2 to 8 percent
Elevation: 3,200 to 3,800 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 100 to 110 days

Composition

Major Components
Meadowpass and similar soils: 85 percent

Minor Components
Battlebutte gravelly loam: 0 to 9 percent
Slopes greater than 8 percent: 0 to 6 percent

Major Component Description

Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Tuff residuum
Native plant cover type: Rangeland
Flooding: None
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.
**Meadowpeak Series**

*Depth class:* Very deep  
*Drainage class:* Poorly drained  
*Permeability:* Moderate  
*Landform:* Flood plains and closed depressions  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 2,200 to 3,800 feet  
*Annual precipitation:* 24 to 34 inches  
*Annual air temperature:* 42 to 45 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, nonacid, frigid Aeric Fluvaquents  

**Typical Pedon**

Meadowpeak silt loam, in an area of Meadowpeak-Firetower silt loams, 0 to 2 percent slopes, in an area of forestland, 2,400 feet south and 1,800 feet east of the northwest corner of sec. 23, T. 27 N., R. 28 W.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid; clear wavy boundary.

AC—4 to 9 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid; clear wavy boundary.

C1—9 to 16 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid; clear wavy boundary.

C2—16 to 25 inches; olive gray (5Y 5/2) silt loam, light gray (5Y 7/2) dry; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, medium, and coarse roots; neutral; gradual wavy boundary.

C3—25 to 34 inches; olive gray (5Y 5/2) and very dark grayish brown (10YR 3/2) silt loam consisting of thin layers of silt loam and loam, light gray (5Y 7/2) and grayish brown (10YR 5/2) dry; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; neutral; gradual wavy boundary.

C4—34 to 60 inches; white (5Y 8/1) silt loam, light brownish gray (2.5Y 6/2) dry; few fine distinct olive yellow (5Y 6/6) redox concentrations; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; neutral.

**Range in Characteristics**

*Soil temperature:* 44 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the seasonal high water table:* 12 to 24 inches  

**A horizon**  
*Value:* 2 or 3 moist; 3 or 4 dry  
*Clay content:* 12 to 18 percent  
*Reaction:* pH 5.6 to 6.5

**AC horizon**  
*Clay content:* 12 to 18 percent  
*Reaction:* pH 5.6 to 7.3

**C1 and C2 horizons**  
*Hue:* 10YR, 2.5Y, or 5Y  
*Value:* 4 or 5 moist; 5, 6, or 7 dry  
*Chroma:* 1 or 2  
*Clay content:* 12 to 18 percent  
*Reaction:* pH 5.6 to 7.3

**C3 and C4 horizons**  
*Hue:* 10YR, 2.5Y, or 5Y  
*Value:* 3, 4, 5, or 6 moist; 5, 6, 7, or 8 dry  
*Chroma:* 1 or 2  
*Texture:* Silt loam or loam  
*Clay content:* 10 to 18 percent  
*Reaction:* pH 5.6 to 7.3

**73A—Meadowpeak silt loam,**  
**0 to 2 percent slopes**

**Setting**

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Elevation:* 2,300 to 3,800 feet  
*Mean annual precipitation:* 24 to 34 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**  
Meadowpeak and similar soils: 85 percent  

**Minor Components**  
Meadowpeak, frequently flooded: 0 to 5 percent  
Firetower silt loam: 0 to 5 percent  
Blacklake mucky peat: 0 to 5 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: Forestland
Flood: Occasional
Water table: Apparent
Available water capacity: Mainly 10.1 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.

731A—Meadowpeak-Firetower silt loams, 0 to 2 percent slopes

Setting

Landform:
• Meadowpeak—Flood plains
• Firetower—Stream terraces
Position on landform:
• Firetower—Treads
Slope:
• Meadowpeak—0 to 2 percent
• Firetower—0 to 2 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Meadowpeak and similar soils: 60 percent
Firetower and similar soils: 30 percent

Minor Components
Blacklake mucky peat: 0 to 5 percent
Tallcreek silt loam: 0 to 3 percent
Slopes greater than 2 percent: 0 to 2 percent

Major Component Description

Meadowpeak
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
Flood: Occasional
Water table: Apparent
Available water capacity: Mainly 10.1 inches

Firetower
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flood: Rare
Water table: Apparent
Available water capacity: Mainly 10.4 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.

732A—Meadowpeak silt loam, 0 to 2 percent slopes, frequently flooded

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Meadowpeak and similar soils: 90 percent

Minor Components
Bigbeaver, occasionally flooded: 0 to 5 percent
Blacklake muck: 0 to 5 percent

Major Component Description

Meadowpeak
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
Flood: Frequent
Water table: Apparent
Available water capacity: Mainly 10.1 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.

Millpocket Series

Depth class: Very deep  
Drainage class: Well drained  
Permeability: Very slow  
Landform: Lake plains and terraces  
Parent material: Lacustrine deposits  
Slope range: 2 to 8 percent  
Elevation: 2,800 to 3,200 feet  
Annual precipitation: 17 to 19 inches  
Frost-free period: 100 to 110 days

Taxonomic Class: Fine, mixed, active, frigid Typic  
Natrixeralfs

Typical Pedon

Millpocket silty clay loam, 2 to 8 percent slopes, in an area of forestland, 3,000 feet south and 1,950 feet west of the northeast corner of sec. 17, T. 23 N., R. 24 W.

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

E—0 to 7 inches; light gray (10YR 7/2) silty clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, slightly plastic; many fine and medium and few coarse roots; many fine pores; neutral; clear smooth boundary.

E/Bt—7 to 11 inches; E part (60 percent) is light gray (10YR 7/2) silty clay loam, grayish brown (10YR 5/2) moist; B part (40 percent) is very pale brown (10YR 7/4) silty clay, yellowish brown (10YR 5/4) moist; strong medium angular blocky structure; hard, firm, moderately sticky, moderately plastic; common fine and few coarse roots; many fine and fine and common medium petals; common faint clay films on faces of peds; neutral; clear smooth boundary.

Bt—11 to 20 inches; very pale brown (10YR 7/4) silty clay, yellowish brown (10YR 5/4) moist; strong medium angular blocky structure; hard, very firm, moderately sticky, very plastic; common fine and few coarse roots; many very fine and fine and common medium petals; common faint clay films on faces of peds; neutral; clear smooth boundary.

Btnk—20 to 28 inches; very pale brown (10YR 7/4) silty clay, light yellowish brown (10YR 6/4) moist; moderate medium angular and subangular blocky structure; hard, firm, very sticky, moderately plastic; common fine and few coarse roots; common fine pores; few faint clay films on faces of peds; common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bnk—28 to 39 inches; very pale brown (10YR 7/4) silty clay, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; slightly hard, firm, very sticky, moderately plastic; few fine roots; few fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

BC—39 to 60 inches; very pale brown (10YR 8/3) silty clay, light yellowish brown (10YR 6/4) moist; massive; slightly hard, firm, very sticky, moderately plastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Depth to the Btnk horizon: 15 to 30 inches  
Notes: Some profiles lack an E/Bt horizon. The BC horizon may contain varved lake sediments.

E horizon

Value: 6 or 7 dry; 4, 5, or 6 moist  
Clay content: 27 to 40 percent  
Reaction: pH 6.6 to 7.3

E/Bt horizon

Value: 6 or 7 dry; 5 or 6 moist  
Chroma: E part: 2; B part: 3 or 4  
Texture: E part: Silty clay loam; B part: Silty clay or silty clay loam  
Clay content: 35 to 50 percent  
Electrical conductivity (mmhos/cm): 0 to 1  
Sodium adsorption ratio: 4 to 13  
Reaction: pH 6.6 to 7.8

Bt horizon

Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 3 or 4  
Texture: Silty clay or silty clay loam  
Clay content: 35 to 60 percent  
Electrical conductivity (mmhos/cm): 0 to 1  
Sodium adsorption ratio: 4 to 13  
Reaction: pH 6.6 to 7.8

Btnk and Bnk horizons

Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 3 or 4  
Texture: Silty clay or silty clay loam  
Clay content: 35 to 55 percent
Calcium carbonate equivalent: 5 to 10 percent
Electrical conductivity (mmhos/cm): 1 to 2
Sodium adsorption ratio: 13 to 30
Reaction: pH 7.9 to 9.0

BC horizon
Value: 6, 7, or 8 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Silty clay or silty clay loam
Clay content: 30 to 50 percent
Calcium carbonate equivalent: 0 to 5 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 20
Reaction: pH 7.4 to 9.0

72B—Millpocket silty clay loam,
2 to 8 percent slopes

Setting
Landform: Lake plains or terraces
Slope: 2 to 8 percent
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 100 to 110 days

Composition
Major Components
Millpocket and similar soils: 85 percent

Minor Components
Wildgen gravelly loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent
Aeric Haplaugepts: 0 to 5 percent

Major Component Description
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Forestland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.7 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.

Minesinger Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Alluvial fans and stream terraces
Parent material: Tertiary sediments
Slope range: 2 to 50 percent
Elevation: 2,700 to 4,500 feet
Annual precipitation: 14 to 18 inches
Frost-free period: 100 to 125 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Typic Argixerolls

Typical Pedon
Minesinger gravelly loam, 4 to 15 percent slopes, in an area of rangeland, 1,000 feet north and 1,600 feet west of the southeast corner of sec. 9, T. 21 N., R. 22 W.

A1—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 moderate fine granular; soft, very friable, slightly sticky, nonplastic; many fine and few medium roots; 5 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

A2—6 to 13 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many fine roots; 10 percent cobbles and 20 percent pebbles; neutral; gradual smooth boundary.

Bt—13 to 24 inches; light yellowish brown (10YR 6/4) very gravelly clay, dark yellowish brown (10YR 4/4) moist; strong fine and medium angular blocky structure; hard, firm, moderately sticky, very plastic; common fine roots; common distinct clay films on faces of peds; 15 percent cobbles and 30 percent pebbles; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bk—24 to 60 inches; very pale brown (10YR 7/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak medium angular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; few fine roots; few faint clay films on faces of peds; 15 percent cobbles and 30 percent pebbles; many fine masses of lime; strongly effervescent; moderately alkaline.
Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 24 to 50 inches

A1 horizon
- Hue: 10YR or 7.5YR
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 1 or 2
- Clay content: 18 to 27 percent
- Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 10 percent cobbles; 10 to 20 percent pebbles
- Reaction: pH 6.6 to 7.3

A2 horizon
- Hue: 10YR or 7.5YR
- Value: 4 or 5 dry; 3 moist
- Chroma: 2 or 3
- Clay content: 18 to 27 percent
- Content of rock fragments: 25 to 50 percent—0 to 15 percent stones; 5 to 15 percent cobbles; 20 to 30 percent pebbles
- Reaction: pH 6.6 to 7.3

Bt horizon
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 3 or 4
- Texture: Clay or clay loam
- Clay content: 35 to 50 percent
- Content of rock fragments: 35 to 55 percent—0 to 10 percent stones; 10 to 15 percent cobbles; 25 to 30 percent pebbles
- Reaction: pH 6.6 to 7.8

Bk horizon
- Hue: 10YR or 7.5YR
- Value: 6 or 7 dry; 5 or 6 moist
- Chroma: 2, 3, or 4
- Texture: Clay loam or clay
- Clay content: 27 to 40 percent
- Content of rock fragments: 35 to 55 percent—0 to 10 percent stones; 10 to 15 percent cobbles; 25 to 30 percent pebbles
- Calcium carbonate equivalent: 3 to 8 percent
- Reaction: pH 7.4 to 8.4

57D—Minesinger gravelly loam, 4 to 15 percent slopes

Setting
- Landform: Alluvial fans and stream terraces
- Position on landform: Treads
- Slope: 4 to 15 percent
- Elevation: 2,700 to 3,500 feet
- Mean annual precipitation: 15 to 17 inches
- Frost-free period: 105 to 125 days

Composition

Major Components
Minesinger and similar soils: 90 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Bowlake gravelly loam: 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: Tertiary age sediments
- Native plant cover type: Rangeland
- Flooding: None
- Available water capacity: Mainly 5.1 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.

57E—Minesinger stony loam, 15 to 30 percent slopes

Setting
- Landform: Alluvial fans and stream terraces
- Position on landform: Dissected or incised treads
- Slope: 15 to 30 percent
- Elevation: 2,700 to 3,500 feet
- Mean annual precipitation: 15 to 17 inches
- Frost-free period: 105 to 125 days
Composition

Major Components
Minesinger and similar soils: 90 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Bowlake gravelly loam: 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: Tertiary age sediments
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

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

59D—Minesinger stony loam, cool, 4 to 15 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 100 to 110 days

Composition

Major Components
Minesinger and similar soils: 90 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Bowlake gravelly loam: 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: Tertiary age sediments
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 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.

59E—Minesinger stony loam, cool, 15 to 30 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Position on landform: Dissected or incised treads
Slope: 15 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 100 to 110 days

Composition

Major Components
Minesinger and similar soils: 90 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Bowlake gravelly loam: 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: Tertiary age sediments
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 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.

59F—Minesinger stony loam, cool, 30 to 50 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Position on landform: Dissected or incised treads
Slope: 30 to 50 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 100 to 110 days

**Composition**

**Major Components**
Minesinger and similar soils: 85 percent

**Minor Components**
Slopes greater than 50 percent: 0 to 8 percent
Areas of rock outcrop: 0 to 5 percent
Bowlake gravelly loam: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Stony loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Tertiary age sediments  
*Native plant cover type:* Rangeland  
*Frosting:* None  
*Available water capacity:* Mainly 5.1 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.

**Mitten Series**

*Depth class:* Very deep  
*Drainage class:* Somewhat excessively drained  
*Permeability:* Moderately rapid  
*Landform:* Mountains  
*Parent material:* Volcanic ash over colluvium  
*Slope range:* 8 to 70 percent  
*Elevation:* 2,200 to 5,500 feet  
*Annual precipitation:* 24 to 36 inches  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

**Typical Pedon**

Mitten gravelly silt loam, 35 to 60 percent slopes, in an area of forestland, 2,000 feet north and 200 feet east of the southwest corner of sec. 17, T. 21 N., R. 24 W.

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

Bw—0 to 7 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 25 percent pebbles; slightly acid; clear smooth boundary.

2E—7 to 21 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; 10 percent cobbles and 45 percent pebbles; slightly acid; gradual wavy boundary.

2E/Bw—21 to 60 inches; E part (75 percent) is pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; B part (25 percent) is yellowish brown (10YR 5/4) extremely gravelly loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; 15 percent cobbles and 55 percent pebbles; slightly acid.

**Range in Characteristics**

*Soil temperature:* 41 to 46 degrees F  
*Moisture control section:* Between 8 and 24 inches  
*Thickness of the volcanic ash-influenced layer:* 7 to 10 inches  

**Bw horizon**

Value: 4 or 5 moist  
Chroma: 3 or 4  
Clay content: 5 to 10 percent  
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
Moist bulk density: 0.95 g/cm³ or less  
Acid oxalate extractable Al + 1/2 Fe: More than 1 percent  
Reaction: pH 5.6 to 6.5

**2E horizon**

Hue: 10YR or 7.5YR  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Texture: Loam or sandy loam  
Clay content: 5 to 10 percent  
Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles; 30 to 50 percent pebbles  
Reaction: pH 5.6 to 6.5

**2E/Bw horizon**

Hue: 7.5YR or 10YR  
Value: E part: 6 or 7 dry; 4 or 5 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 10 percent
Content of rock fragments: 60 to 80 percent—
10 to 20 percent cobbles; 50 to 60 percent pebbles
Reaction: pH 5.6 to 6.5

32E—Mitten gravelly silt loam,
15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mitten and similar soils: 85 percent

Minor Components
Slopes greater than 35 percent: 0 to 5 percent
Holloway gravelly silt loam: 0 to 5 percent
Tevis gravelly loam, dry: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
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.

32F—Mitten gravelly silt loam,
35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Major Component Description
Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained

32G—Mitten-Rubble land complex,
40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mitten and similar soils: 55 percent
Rubble land: 30 percent

Minor Components
Areas of rock outcrop: 0 to 9 percent
Holloway gravelly silt loam: 0 to 6 percent

Major Component Description
Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.5 inches

Rubble land
Definition: Areas covered by boulders or stones that support 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.

33E—Mitten gravelly silt loam, dry, 15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 3,900 to 5,500 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mitten and similar soils: 90 percent

Minor Components
Slopes greater than 35 percent: 0 to 5 percent
Tevis gravelly loam: 0 to 5 percent
Areas of rubble land: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 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.

33F—Mitten gravelly silt loam, dry, 35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,900 to 5,500 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mitten and similar soils: 85 percent

Minor Components
Tevis gravelly loam, dry: 0 to 5 percent
Areas of rubble land: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 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.

132F—Mitten-Tevis complex, 35 to 60 percent slopes

Setting
Landform:
• Mitten—Mountains
• Tevis—Mountains
Slope:
• Mitten—35 to 60 percent
• Tevis—35 to 60 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

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

Major Components
Mitten and similar soils: 50 percent
Tevis and similar soils: 35 percent

Minor Components
Areas of rubble land: 0 to 5 percent
Holloway gravelly silt loam: 0 to 5 percent
Tevis gravelly loam, dry: 0 to 5 percent

Major Component Description

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Tevis
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 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.

374F—Mitten-Rock outcrop complex, 40 to 70 percent slopes

Setting

Landform: Mountains
Slope: 40 to 70 percent
Elevation: 3,600 to 4,800 feet
Mean annual precipitation: 28 to 36 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Mitten and similar soils: 60 percent
Rock outcrop: 30 percent

Minor Components
Sharrott gravelly loam, cool: 0 to 5 percent
Slopes less than 40 percent: 0 to 5 percent

Major Component Description

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

Management

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

Mocmont Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Colluvium derived from argillite and quartzite
Slope range: 8 to 35 percent
Elevation: 3,200 to 5,000 feet
Annual precipitation: 18 to 22 inches
Annual air temperature: 38 to 43 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

Typical Pedon

Mocmont very gravelly loam, in an area of Mocmont-Winkler complex, 8 to 35 percent slopes, in an area of forestland, 1,300 feet south and 400 feet west of the northeast corner of sec. 18, T. 18 N., R. 23 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
E—0 to 14 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly
hard, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 15 percent cobbles and 30 percent pebbles; slightly acid; gradual smooth boundary.

**Bt/E**—14 to 30 inches; B part (70 percent) is pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; E part (30 percent) is light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; common very fine, fine, medium, and coarse roots; few faint clay films on faces of peds; 15 percent cobbles and 35 percent pebbles; slightly acid; gradual smooth boundary.

**Bt**—30 to 46 inches; light yellowish brown (10YR 6/4) extremely cobbly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common distinct clay films on faces of peds; 30 percent cobbles and 45 percent pebbles; slightly acid; gradual smooth boundary.

**C**—46 to 60 inches; pale brown (10YR 6/3) extremely cobbly loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky, slightly plastic; 30 percent cobbles and 45 percent pebbles; neutral.

**Range in Characteristics**

**Soil temperature**: 42 to 45 degrees F

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

**Note**: Some pedons have a thin A horizon.

**E horizon**
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Clay content: 10 to 20 percent
- Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent pebbles
- Reaction: pH 5.6 to 6.5

**Bt/E horizon**
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2, 3, or 4
- Clay content: 15 to 25 percent
- Content of rock fragments: 35 to 60 percent—10 to 15 percent cobbles; 25 to 45 percent pebbles
- Reaction: pH 6.1 to 6.5

**Bt horizon**
- Value: 5, 6, or 7 dry; 4 or 5 moist
- Chroma: 3 or 4
- Clay content: 27 to 35 percent
- Content of rock fragments: 60 to 85 percent—20 to 30 percent cobbles; 40 to 55 percent pebbles
- Reaction: pH 6.1 to 6.5

**C horizon**
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 3 or 4
- Clay content: 10 to 25 percent
- Content of rock fragments: 60 to 90 percent—25 to 40 percent cobbles; 35 to 50 percent pebbles
- Reaction: pH 6.6 to 7.3

**123E—Mocmont-Winkler complex, 8 to 35 percent slopes**

**Setting**

**Landform**
- Mocmont—Mountains
- Winkler—Mountains

**Slope**
- Mocmont—8 to 35 percent
- Winkler—8 to 35 percent

**Elevation**: 3,200 to 5,000 feet

**Mean annual precipitation**: 18 to 22 inches

**Frost-free period**: 70 to 90 days

**Composition**

**Major Components**
- Mocmont and similar soils: 50 percent
- Winkler and similar soils: 35 percent

**Minor Components**
- Slopes greater than 35 percent: 0 to 5 percent
- Areas of rubble land: 0 to 5 percent
- Areas of rock outcrop: 0 to 5 percent

**Major Component Description**

**Mocmont**
- **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 3.9 inches

**Winkler**
- **Surface layer texture**: Gravelly 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

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

Management

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

**Moiese Series**

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid to the 2Bk horizon;
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Annual air temperature: 43 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Calcic Haploxerolls

**Typical Pedon**

Moiese gravelly loam, 0 to 4 percent slopes, in an area of pasture, 3,200 feet north and 1,250 feet east of the southwest corner of sec. 13, T. 20 N., R. 22 W.

A—0 to 7 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 and fine roots; 20 percent pebbles; slightly acid; abrupt smooth boundary.

Bw1—7 to 11 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 40 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw2—11 to 16 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, friable, nonsticky, nonplastic; few fine roots; 5 percent cobbles and 45 percent pebbles; few faint coats of lime on undersides of fragments; strongly effervescent; slightly alkaline; gradual smooth boundary.

2Bk—16 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few fine roots; 20 percent cobbles and 55 percent pebbles; common prominent coats of lime on undersides of fragments; violently effervescent; moderately alkaline.

**Range in Characteristics**

Soil temperature: 45 to 47 degrees F
Moisture control section: Between 12 and 35 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the 2Bk horizon: 12 to 19 inches

A horizon
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 6.1 to 7.3

Bw horizons
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 45 percent pebbles
Calcium carbonate equivalent: 0 to 1 percent
Reaction: pH 6.6 to 7.8

2Bk horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 5 percent
Content of rock fragments: 50 to 75 percent—0 to 20 percent cobbles; 50 to 55 percent pebbles
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.4 to 8.4

**2B—Moiese gravelly loam, 0 to 4 percent slopes**

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days
Composition

Major Components
Moiese and similar soils: 90 percent

Minor Components
Moiese gravelly loam, stony: 0 to 4 percent
Slopes greater than 4 percent: 0 to 4 percent
Grantsdale silt loam: 0 to 2 percent

Major Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
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.

Mollman Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Moraines, glacial trough walls, and mountains
Parent material: Alpine till or glacial drift
Slope range: 2 to 60 percent
Elevation range: 3,400 to 4,200 feet
Annual precipitation: 24 to 34 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Eutrudepts

Typical Pedon

Mollman gravelly loam, 30 to 50 percent slopes, in an area of forestland, 1,200 feet north and 500 feet west of the southeast corner of sec. 24, T. 25 N., R. 27 W.

Oi—1 to 0 inches; undecomposed and slightly decomposed forest litter.
E—0 to 10 inches; grayish brown (10YR 5/2) gravelly loam, light gray (10YR 7/2) dry; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium and few coarse roots; 5 percent cobbles and 20 percent pebbles; neutral; gradual wavy boundary.
E/Bw—10 to 20 inches; E part (60 percent) grayish brown (10YR 5/2) very gravelly loam, light gray (10YR 7/2) dry; B part (40 percent) brown (10YR 5/3) very gravelly loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium and few coarse roots; 10 percent cobbles and 25 percent pebbles; neutral; abrupt wavy boundary.
Bk1—20 to 24 inches; brown (10YR 5/3) very gravelly loam, very pale brown (10YR 7/3) dry; weak medium and coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine, fine, and medium and few coarse roots; 10 percent cobbles and 30 percent pebbles; disseminated lime; many distinct lime coatings on undersides of fragments; strongly effervescent; moderately alkaline; clear wavy boundary.
Bk2—24 to 41 inches; brown (7.5YR 5/2) very gravelly loam, pinkish gray (7.5YR 7/2) dry; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 10 percent cobbles and 35 percent pebbles; disseminated lime; many distinct lime coatings on undersides of fragments; violently effervescent; moderately alkaline; gradual wavy boundary.
Bk3—41 to 60 inches; pinkish gray (7.5YR 6/2) very gravelly loam, pinkish white (7.5YR 8/2) dry; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 10 percent cobbles and 50 percent pebbles; disseminated lime; many distinct lime coatings on undersides of fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 20 to 40 inches

E horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles
Reaction: pH 6.1 to 7.3

E/Bw horizon
Hue: E part: 10YR or 2.5Y; 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, 3, or 4; B part: 3, 4, 6, or 8
Texture: Loam or silt loam
Clay content: 10 to 27 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
Reaction: pH 6.1 to 7.3

Bk horizons
Hue: 10YR or 2.5Y
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam or silt loam
Clay content: 15 to 27 percent
Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

97F—Mollman gravelly loam, 30 to 50 percent slopes

Setting
Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mollman and similar soils: 90 percent

Minor Components
Ashworth gravelly silt loam: 0 to 5 percent
Slopes greater than 8 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: Alpine till or glacial drift
Native plant cover type: Forestland
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.

897C—Mollman gravelly loam, 2 to 8 percent slopes

Setting
Landform: Moraines
Slope: 2 to 8 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Mollman and similar soils: 90 percent

Minor Components
Ashworth gravelly silt loam: 0 to 5 percent
Slopes greater than 8 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: Alpine till or glacial drift
Native plant cover type: Forestland
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.

897E—Mollman gravelly loam, 8 to 30 percent slopes

Setting
Landform: Moraines
Slope: 8 to 30 percent
Elevation: 3,400 to 4,200 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 70 to 90 days
**Composition**

**Major Components**
Mollman and similar soils: 90 percent

**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Bendahl gravelly silt loam: 0 to 3 percent
Mollman gravelly loam, dry: 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:* Alpine till or glacial drift  
*Native plant cover type:* Forestland  
*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.

971E—Mollman gravelly loam, dry, 15 to 30 percent slopes

**Setting**
*Landform:* Moraines  
*Slope:* 15 to 30 percent  
*Elevation:* 3,400 to 4,200 feet  
*Mean annual precipitation:* 24 to 28 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Mollman and similar soils: 90 percent

**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Bendahl gravelly silt loam: 0 to 3 percent
Lesier gravelly silt loam: 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:* Alpine till or glacial drift  
*Native plant cover type:* Forestland  
*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.

971F—Mollman gravelly loam, dry, 30 to 50 percent slopes

**Setting**
*Landform:* Mountains  
*Slope:* 30 to 50 percent  
*Elevation:* 3,400 to 4,200 feet  
*Mean annual precipitation:* 24 to 28 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**
Mollman and similar soils: 90 percent

**Minor Components**
Mollman gravelly loam: 0 to 5 percent
Mitten gravelly silt loam: 0 to 4 percent
Areas of rock outcrop: 0 to 1 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 or glacial drift  
*Native plant cover type:* Forestland  
*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.

**Murrstead Series**

**Depth class:** Very deep  
**Drainage class:** Very poorly drained  
**Permeability:** Moderate  
**Landform:** Flood plains
Parent material: Organic materials and alluvium
Slope range: 0 to 2 percent
Elevation range: 3,200 to 3,800 feet
Annual precipitation: 24 to 30 inches
Annual air temperature: 40 to 43 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Euic, frigid Fluvaquentic
Haplohemists

Typical Pedon

Murrstead mucky peat, 0 to 2 percent slopes, in an area of wet meadow hayland, 500 feet south and 950 feet west of the northeast corner of sec. 8, T. 25 N., R. 26 W.

Oe1—0 to 8 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); 60 percent fiber and raw herbaceous plant material—30 percent rubbed; weak very fine granular structure; nonsticky nonplastic; herbaceous fiber, mostly residue from Phragmites arundinacea; many very fine and fine roots; slightly acid; clear smooth boundary.

Oe2—8 to 12 inches; very dark gray (10YR 3/1) broken face mucky peat (hemic material); very dark brown (10YR 2/2) rubbed and pressed; 50 percent fiber—20 percent rubbed; strong thick platy structure parting to weak thin platy; nonsticky nonplastic; herbaceous fiber; many very fine and fine roots; slightly acid; clear smooth boundary.

Oe/C—12 to 21 inches; stratified (1/4 to 3/4 inch) black (10YR 2/1) broken face and rubbed mucky peat (hemic material) (50 percent), 50 percent fiber—20 percent rubbed; and very dark brown (10YR 3/2) mucky silt loam (40 percent), and dark gray (10YR 4/1) silt loam (10 percent); weak thin platy structure parting to weak fine granular; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; slightly acid; abrupt wavy boundary.

Oe3—21 to 46 inches; stratified (1/4 to 3/4 inch) black (10YR 2/1) and very dark gray (10YR 3/1) broken face mucky peat (stratified hemic (80 percent) and fibric (20 percent) material); black (10YR 2/1) rubbed and pressed, 40 percent fiber—20 percent rubbed; massive; nonsticky nonplastic; herbaceous fiber, mostly leaves of Alnus tenuifolia; common very fine and fine roots; moderately acid; abrupt wavy boundary.

Cg—46 to 54 inches; stratified (1/4 to 1/2 inch) light gray (5Y 6/1) silt and very fine sandy loam; massive; soft, very friable, nonsticky, nonplastic; few fine roots; moderately acid; abrupt wavy boundary.

Oe'—54 to 60 inches; stratified (1/4 to 1 inch) black (10YR 2/1) and very dark brown (10YR 2/2) broken face mucky peat (hemic (70 percent) and sapric (30 percent) material) and black (10YR 2/1) rubbed and pressed, 40 percent fiber—20 percent rubbed; thin strata of very dark gray (10YR 3/1) silt loam; massive; nonsticky nonplastic; herbaceous fiber; few fine roots; moderately acid.

Range in Characteristics

Soil temperature: 42 to 45 degrees F
Thickness of organic material: Greater than 52 inches
Depth to the seasonal high water table: Surface to 12 inches
Depth to the Cg horizon: 38 to 50 inches

Notes: The combined thickness of the Oe1 and Oe2 horizons is 12 to 23 inches. C/Oe or thin C horizons are present in some pedons. An Oa horizon is present in some pedons.

Oe1 and Oe2 horizons
Value: 2 or 3
Chroma: 1 or 2
Fiber content, unrubbed: 40 to 60 percent
Fiber content, rubbed: 20 to 30 percent
Reaction: pH 5.6 to 6.5

Oe/C horizon
Value: Oe part: 2 or 3; C part: 2, 3, or 4
Chroma: 1 or 2
Fiber content, unrubbed, Oe part: 40 to 60 percent
Fiber content, rubbed, Oe part: 20 to 30 percent
Texture: C part: Silt loam and mucky silt loam
Clay content: C part: 5 to 15 percent
Reaction: pH 5.6 to 6.5

Oe3 horizon
Value: 2 or 3
Chroma: 1 or 2
Fiber content, unrubbed, Oe part: 40 to 60 percent
Fiber content, rubbed, Oe part: 20 to 30 percent
Reaction: pH 5.6 to 6.5

Cg horizon
Hue: 5Y, 5GY, 5G, or N
Value: 5 or 6
Chroma: 0, 1, or 2
Texture: Stratified silt loam, silt, or very fine sandy loam; averaging less than 15 percent fine sand or coarser
Clay content: 4 to 12 percent
Reaction: pH 5.6 to 6.5
**Oe’ horizon**
- Value: 2 or 3
- Fiber content, unrubbed: 40 to 60 percent
- Fiber content, rubbed: 20 to 30 percent
- Reaction: pH 5.6 to 6.5

**6A—Murrstead mucky peat, 0 to 2 percent slopes**

**Setting**
- **Landform**: Flood plains
- **Slope**: 0 to 2 percent
- **Elevation**: 3,200 to 3,800 feet
- **Mean annual precipitation**: 24 to 30 inches
- **Frost-free period**: 70 to 90 days

**Composition**

**Major Components**
- Murrstead and similar soils: 90 percent

**Minor Components**
- McLangor mucky peat: 0 to 7 percent
- Meadowpeak, occasionally flooded: 0 to 3 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**: Organic deposits
- **Native plant cover type**: Rangeland
- **Flooding**: Frequent
- **Water table**: Apparent
- **Available water capacity**: Mainly 18.7 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.

**Niarada Series**

**Depth class**: Very deep
- **Drainage class**: Well drained
- **Permeability**: Moderate
- **Landform**: Hills
- **Parent material**: Calcareous alluvium, colluvium, or glacial drift
- **Slope range**: 4 to 60 percent
- **Elevation**: 2,600 to 4,900 feet

**Typical Pedon**

Niarada gravelly loam, 4 to 15 percent slopes, in an area of rangeland, 2,250 feet north and 2,040 feet west of the southeast corner of sec. 18, T. 20 N., R. 21 W.

A1—0 to 8 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 and fine roots; 20 percent pebbles; neutral; clear smooth boundary.

A2—8 to 13 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; 15 percent cobbles and 25 percent pebbles; neutral; clear smooth boundary.

Bw—13 to 26 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 15 percent cobbles and 30 percent pebbles; slightly alkaline; clear smooth boundary.

Bk1—26 to 29 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine roots; 20 percent cobbles and 25 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—29 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; 15 percent cobbles and 40 percent pebbles; many fine masses of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature**: 43 to 47 inches
**Moisture control section**: Between 4 and 12 inches
**Thickness of the mollic epipedon**: 7 to 20 inches
**Depth to the Bk horizon**: 18 to 30 inches

**A horizon**
- Value: 4 or 5 dry; 2 or 3 moist
- **Chroma**: 2 or 3
- **Clay content**: 10 to 20 percent
Content of rock fragments: 15 to 50 percent—0 to 15 percent cobbles; 15 to 35 percent pebbles
Reaction: pH 6.6 to 7.8

**Bw horizon**
- Value: 5 or 6 dry; 4 or 5 moist
- Chroma: 2, 3, or 4
- Clay content: 10 to 20 percent
- Content of rock fragments: 35 to 60 percent—10 to 15 percent cobbles; 25 to 45 percent pebbles
- Reaction: pH 6.6 to 7.8

**Bk horizons**
- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Sandy loam or loam
- Clay content: 10 to 18 percent
- Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
- Calcium carbonate equivalent: 15 to 25 percent
- Reaction: pH 7.9 to 8.4

**55D—Niarada gravelly loam, 4 to 15 percent slopes**

**Setting**
- Landform: Hills
- Slope: 4 to 15 percent
- Elevation: 2,600 to 4,200 feet
- Mean annual precipitation: 15 to 17 inches
- Frost-free period: 100 to 110 days

**Composition**
- Major Components
  - Niarada and similar soils: 85 percent
- Minor Components
  - Minesinger gravelly loam: 0 to 5 percent
  - Niarada stony loam: 0 to 5 percent
  - Slopes greater than 15 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: Alluvium or colluvium
- 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.

**55E—Niarada gravelly loam, 15 to 30 percent slopes**

**Setting**
- Landform: Hills
- Slope: 15 to 30 percent
- Elevation: 2,600 to 4,200 feet
- Mean annual precipitation: 15 to 17 inches
- Frost-free period: 100 to 110 days

**Composition**
- Major Components
  - Niarada and similar soils: 85 percent
- Minor Components
  - Minesinger gravelly loam: 0 to 5 percent
  - Niarada stony loam: 0 to 5 percent
  - Slopes greater than 30 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: Colluvium or glacial drift
- 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.

**55F—Niarada gravelly loam, 30 to 60 percent slopes**

**Setting**
- Landform: Hills
- Slope: 30 to 60 percent
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 15 to 17 inches
Frost-free period: 100 to 110 days

**Composition**

**Major Components**
Niarada and similar soils: 85 percent

**Minor Components**
Niarada stony loam: 0 to 9 percent
Minesinger gravelly loam: 0 to 6 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 or glacial drift
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.

60D—Niarada gravelly loam, cool, 4 to 15 percent slopes

**Setting**
Landform: Hills
Slope: 4 to 15 percent
Elevation: 3,000 to 4,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 90 to 110 days

**Composition**

**Major Components**
Niarada and similar soils: 85 percent

**Minor Components**
Niarada gravelly loam: 0 to 5 percent
Finleypoint gravelly loam, dry: 0 to 4 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: Colluvium or glacial drift
Native plant cover type: Rangeland
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.

60E—Niarada gravelly loam, cool, 15 to 30 percent slopes

**Setting**
Landform: Hills
Slope: 15 to 30 percent
Elevation: 3,000 to 4,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 90 to 110 days

**Composition**

**Major Components**
Niarada and similar soils: 85 percent

**Minor Components**
Niarada gravelly loam: 0 to 4 percent
Finleypoint gravelly loam, dry: 0 to 4 percent
Slopes greater than 30 percent: 0 to 4 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: Colluvium or glacial drift
Native plant cover type: Rangeland
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.
60F—Niarada gravelly loam, cool, 30 to 60 percent slopes

Setting

Landform: Hills
Slope: 30 to 60 percent
Elevation: 3,000 to 4,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 90 to 110 days

Composition

Major Components
Niarada and similar soils: 85 percent

Minor Components
Finleypoint gravelly loam, dry: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Areas of rubble land: 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: Colluvium or glacial drift
Native plant cover type: Rangeland
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.

Noxlin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Volcanic ash over alluvium and glacial outwash
Slope range: 4 to 35 percent
Elevation range: 2,200 to 2,700 feet
Annual precipitation: 28 to 32 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Andic Paleudalfs

Typical Pedon

Noxlin silt loam, in an area of Noxlin-Fernline silt loams, 4 to 15 percent slopes, stony, in an area of forestland, 2,000 feet south and 2,100 feet east of the northwest corner of sec. 34, T. 24 N., R. 31 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; slightly acid; clear wavy boundary.
Bw—1 to 10 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium and few coarse roots; 5 percent pebbles; slightly acid; clear wavy boundary.
2E—10 to 26 inches; light brownish gray (10YR 6/2) very gravelly loam, white (10YR 8/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; 10 percent cobbles and 35 percent pebbles; neutral; gradual wavy boundary.
2E/Bt—26 to 38 inches; E part (70 percent) is light brownish gray (10YR 6/2) very gravelly loam, white (10YR 8/2) dry; B part (30 percent) is brown (7.5YR 5/4) very gravelly loam, pink (7.5YR 7/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse roots; common distinct clay films on faces of peds; 5 percent cobbles and 45 percent pebbles; neutral; gradual wavy boundary.
2Bt/E—38 to 60 inches; B part (70 percent) is brown (7.5YR 5/4) very gravelly loam, pink (7.5YR 7/4) dry; E part (30 percent) is light brownish gray (10YR 6/2) very gravelly loam, white (10YR 8/2) dry; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few coarse roots; many distinct clay films on faces of peds; 10 percent cobbles and 45 percent pebbles; neutral.
Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches

A horizon
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Clay content: 5 to 15 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1.0 to 1.5 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.6 to 6.5

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 5 to 15 percent
Moist bulk density: 0.85 to 1.0 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.6 to 6.5

2E horizon
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 55 percent—5 to 15 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 7.3

2E/Bt horizon
Hue: E part: 10YR; B part: 10YR or 7.5YR
Value: E part: 6, 7, or 8 dry, 5, 6, or 7 moist;
B part: 5, 6, or 7 dry, 4, 5, or 6 moist
Clay content: E part: 8 to 18 percent; B part: 18 to 27 percent
Content of rock fragments: 40 to 60 percent—5 to 15 percent cobbles; 35 to 45 percent pebbles
Reaction: pH 5.6 to 7.3

Management

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

81E—Noxlin silt loam, 8 to 35 percent slopes, stony

Setting
Landform: Stream terraces
Position on landform: Dissected or incised treads
Slope: 8 to 35 percent
Elevation: 2,200 to 2,700 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Noxlin and similar soils: 90 percent

Minor Components
Slopes greater than 35 percent: 0 to 5 percent
Fernline silt loam: 0 to 5 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.7 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.

811D—Noxlin-Fernline silt loams, 4 to 15 percent slopes, stony

Setting
Landform:
- Noxlin—Stream terraces
- Fernline—Lake plains or terraces
**Position on landform:**
- Noxlin—Dissected or incised treads
- Fernline—Dissected or incised treads

**Slope:**
- Noxlin—4 to 15 percent
- Fernline—4 to 15 percent

**Elevation:** 2,200 to 2,700 feet  
**Mean annual precipitation:** 28 to 32 inches  
**Frost-free period:** 90 to 105 days

**Composition**

**Major Components**
- Noxlin and similar soils: 55 percent
- Fernline and similar soils: 30 percent

**Minor Components**
- Dewberry gravelly silt loam: 0 to 5 percent
- Slopes greater than 15 percent: 0 to 5 percent
- Noxlin silt loam, bouldery: 0 to 3 percent
- Stargulch very fine sandy loam: 0 to 2 percent

**Major Component Description**

**Noxlin**
- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Volcanic ash over alluvium or outwash
- **Native plant cover type:** Forestland
- **Flooding:** None
- **Available water capacity:** Mainly 6.7 inches

**Fernline**
- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Volcanic ash over glaciolacustrine
- **Native plant cover type:** Forestland
- **Flooding:** None
- **Available water capacity:** Mainly 10.3 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.

**Oldtrail Series**

**Depth class:** Very deep  
**Drainage class:** Moderately well drained  
**Permeability:** Rapid

**Landform:** Flood plains and drainageways  
**Parent material:** Alluvium  
**Slope range:** 0 to 8 percent  
**Elevation range:** 2,200 to 4,200 feet  
**Annual precipitation:** 20 to 34 inches  
**Annual air temperature:** 42 to 45 degrees F  
**Frost-free period:** 70 to 105 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Oxyaquic Udifluvents

**Typical Pedon**
Oldtrail gravelly sandy loam, 0 to 8 percent slopes, in an area of forestland, 100 feet north and 100 feet west of the center of sec. 33, T. 26 N., R. 33 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; slightly hard, friable, nonsticky, nonplastic; many very fine and common fine roots; 5 percent cobbles and 30 percent pebbles; moderately acid; clear wavy boundary.

C1—4 to 12 inches; dark grayish brown (10YR 4/2) extremely gravelly loamy coarse sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; common fine and very fine roots; 20 percent cobbles and 50 percent pebbles; moderately acid; abrupt wavy boundary.

C2—12 to 25 inches; dark grayish brown (10YR 4/2) extremely cobbly loamy coarse sand, with thin strata of sand; light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; 40 percent cobbles and 30 percent pebbles; moderately acid; gradual wavy boundary.

C3—25 to 60 inches; stratified dark grayish brown (10YR 4/2) extremely cobbly loamy coarse sand, light brownish gray (10YR 6/2) dry, and very dark grayish brown (10YR 3/2) extremely gravelly loamy coarse sand, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky, nonplastic; few very fine roots; 40 percent cobbles and 30 percent pebbles; moderately acid.

**Range in Characteristics**

**Soil temperature:** 42 to 45 degrees F  
**Moisture control section:** Between 12 and 35 inches  
**Depth to the seasonal high water table:** 24 to 42 inches

A horizon  
- **Value:** 3 or 4 moist; 5 or 6 dry  
- **Chroma:** 2 or 3  
- **Clay content:** 0 to 10 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles
Reaction: pH 5.6 to 6.5

C1 horizon
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 2 or 3
Texture: Loamy coarse sand or coarse sandy loam
Clay content: 0 to 5 percent
Content of rock fragments: 60 to 80 percent—10 to 20 percent cobbles; 50 to 60 percent pebbles
Reaction: pH 5.6 to 6.5

C2 and C3 horizons
Value: 3, 4, or 5 moist; 5, 6, or 7 dry
Chroma: 2 or 3
Texture: Loamy coarse sand, coarse sand, or loamy sand
Clay content: 0 to 5 percent
Content of rock fragments: 60 to 80 percent—(30 to 40 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 6.5

41B—Oldtrail-Glaciercreek-Larchpoint complex, 0 to 8 percent slopes

Setting

Landform:
• Oldtrail—Flood plains
• Glaciercreek—Stream terraces and outwash plains
• Larchpoint—Flood plains
Slope:
• Oldtrail—0 to 8 percent
• Glaciercreek—2 to 8 percent
• Larchpoint—0 to 2 percent
Elevation: 3,100 to 4,200 feet
Mean annual precipitation: 20 to 28 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Oldtrail and similar soils: 40 percent
Glaciercreek and similar soils: 25 percent
Larchpoint and similar soils: 20 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent
Larchpoint silt loam: 0 to 5 percent

Major Component Description

Oldtrail
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 2.2 inches

Glaciercreek
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.7 inches

Larchpoint
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: Forestland
Flooding: Occasional
Water table: Apparent
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.

92C—Oldtrail gravelly sandy loam, 0 to 8 percent slopes

Setting

Landform: Drainageways
Slope: 0 to 8 percent
Elevation: 2,200 to 3,400 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Oldtrail and similar soils: 90 percent
Minor Components
Ibex silt loam: 0 to 4 percent
Oldtrail cobbly sandy loam: 0 to 4 percent
Areas of riverwash: 0 to 2 percent

Major Component Description
Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 2.2 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.

Pashua Series
Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Mountains
Parent material: Colluvium and residuum derived from semiconsolidated welded tuff
Slope range: 8 to 30 percent
Elevation: 3,200 to 3,800 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 39 to 42 degrees F
Frost-free period: 80 to 100 days

Taxonomic Class: Fine, mixed, active, frigid Typic Haplustalfs

Typical Pedon
Pashua gravelly loam, 8 to 30 percent slopes, in an area of forestland, 1,050 feet north and 500 feet west of the southeast corner of sec. 34. T. 25 N., R. 24 W.

A—0 to 8 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine, fine, and medium and few coarse roots; few fine tubular pores; 20 percent pebbles; slightly acid; clear smooth boundary.
E—8 to 14 inches; very pale brown (10YR 7/3) gravelly silt loam, light yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine, common fine and medium, and few coarse roots; many very fine and common fine tubular pores; 5 percent cobbles, 15 percent pebbles, and 15 percent soft fragments; neutral; clear smooth boundary.
Bt/E—14 to 19 inches; B part (70 percent) is brownish yellow (10YR 6/6) gravelly clay, yellowish brown (10YR 5/6) moist; E part (30 percent) is very pale brown (10YR 8/4) sandy clay, light yellowish brown (10YR 6/4) moist; moderate medium and coarse angular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 5 percent cobbles, 20 percent pebbles, and 5 percent soft fragments; neutral; clear smooth boundary.
Bt1—19 to 25 inches; yellow (10YR 7/6) clay, yellowish brown (10YR 5/6) moist; strong medium angular blocky structure; hard, firm, moderately sticky, moderately plastic; few fine and coarse roots; many very fine and fine tubular pores; common distinct clay films on faces of peds and in pores; 10 percent pebbles and 15 percent soft fragments; neutral; gradual smooth boundary.
Bt2—25 to 37 inches; yellow (10YR 7/6) gravelly clay loam, brownish yellow (10YR 6/6) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 10 percent cobbles, 15 percent pebbles, and 25 percent soft fragments; neutral; clear smooth boundary.
Cr—37 to 60 inches; semiconsolidated welded tuff.

Range in Characteristics
Soil temperature: 41 to 44 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Cr horizon: 20 to 40 inches
Note: When mixed to 7 inches, the surface layer fails to meet the requirements of a mollic epipedon.

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles
Reaction: pH 6.1 to 6.5
**E horizon**
- Value: 6, 7, or 8 dry; 4, 5, or 6 moist
- Chroma: 3 or 4
- Texture: Loam or silt loam
- Clay content: 10 to 27 percent
- Content of rock fragments: 15 to 50 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles; 0 to 15 percent soft fragments
- Reaction: pH 6.1 to 7.3

**Bt/E horizon**
- Hue: 10YR or 2.5Y
- Value: Bt part: 6 or 7 dry, 4, 5, or 6 moist; E part: 6, 7, or 8 dry, 5 or 6 moist
- Chroma: 3, 4, or 6
- Texture: Clay or sandy clay
- Clay content: 35 to 50 percent
- Content of rock fragments: 10 to 50 percent—0 to 10 percent cobbles; 5 to 30 percent pebbles; 5 to 10 percent soft fragments
- Reaction: pH 6.1 to 7.3

**Bt1 horizon**
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 4 or 6
- Texture: Clay or sandy clay
- Clay content: 35 to 60 percent
- Content of rock fragments: 10 to 45 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles; 5 to 20 percent soft fragments
- Reaction: pH 6.1 to 7.3

**Bt2 horizon**
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 3, 4, or 6
- Texture: Clay or clay loam
- Clay content: 27 to 50 percent
- Content of rock fragments: 20 to 60 percent—0 to 10 percent cobbles; 5 to 20 percent pebbles; 15 to 30 percent soft fragments
- Reaction: pH 6.1 to 7.3

**87E—Pashua gravelly loam, 8 to 30 percent slopes**

**Setting**
- Landform: Mountains
- Slope: 8 to 30 percent
- Elevation: 3,200 to 3,800 feet
- Mean annual precipitation: 20 to 24 inches
- Frost-free period: 80 to 100 days

**Composition**

**Major Components**
- Pashua and similar soils: 90 percent

**Minor Components**
- Lozeau gravelly loam: 0 to 5 percent
- Slopes greater than 30 percent: 0 to 5 percent

**Major Component Description**
- Surface layer texture: Gravelly loam
- Depth class: Moderately deep (20 to 40 inches)
- Drainage class: Well drained
- Dominant parent material: Tuff residuum
- 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.

**Petty Series**

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Moderately rapid
**Landform:** Mountains
**Parent material:** Volcanic ash over colluvium derived from granite and gneiss
**Slope range:** 8 to 70 percent
**Elevation:** 5,000 to 6,500 feet
**Annual precipitation:** 36 to 45 inches
**Annual air temperature:** 37 to 42 degrees F
**Frost-free period:** 40 to 50 days

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

**Typical Pedon**
- Petty gravelly loam, 8 to 30 percent slopes, in an area of forestland, 100 feet south and 200 feet east of the northwest corner of sec. 19, T. 18 N., R. 23 W.

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

Bw—0 to 12 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine,
fine, and medium and common coarse roots; 5 percent cobbles and 25 percent pebbles; slightly acid; clear smooth boundary.

2E/Bw—12 to 28 inches; E part (60 percent) is very pale brown (10YR 7/3) very gravelly coarse sandy loam, brown (10YR 5/3) moist; B part (40 percent) is pale brown (10YR 6/3) very gravelly coarse sandy loam, brown (10YR 5/3) moist; weak coarse subangular block structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 10 percent cobbles and 30 percent pebbles; moderately acid; clear wavy boundary.

2C—28 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly loamy sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; 40 percent cobbles and 30 percent pebbles; moderately acid; clear smooth boundary.

**Range in Characteristics**

*Soil temperature:* 39 to 44 degrees F  
*Moisture control section:* 8 to 24 inches  
*Thickness of the volcanic ash-influenced layer:* 7 to 14 inches

**Bw horizon**

Value: 5 or 6 dry; 3 or 4 moist  
Chroma: 4 or 6  
Clay content: 7 to 15 percent  
Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 15 to 25 percent pebbles  
Moist bulk density: Less than 0.95 g/cm³  
Reaction: pH 5.6 to 6.5

**2E/Bw horizon**

Value: E part: 6 or 7 dry; 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist  
Chroma: 3, 4, or 6  
Clay content: 5 to 15 percent  
Content of rock fragments: 35 to 60 percent—5 to 15 percent stones and cobbles; 30 to 45 percent pebbles  
Reaction: pH 5.6 to 6.5

**2C horizon**

Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 3, 4, or 6  
Clay content: 5 to 15 percent  
Content of rock fragments: 45 to 70 percent—5 to 40 percent stones and cobbles; 30 to 40 percent pebbles  
Reaction: pH 5.6 to 6.5

**47E—Petty gravelly loam,**  
**8 to 30 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 8 to 30 percent  
*Elevation:* 5,000 to 6,500 feet  
*Mean annual precipitation:* 36 to 45 inches  
*Frost-free period:* 40 to 50 days

**Composition**

*Major Components*  
Petty and similar soils: 85 percent

*Minor Components*  
Slopes greater than 30 percent: 0 to 8 percent  
Petty stony loam: 0 to 5 percent  
Selway gravelly sandy loam: 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:* Volcanic ash over colluvium  
*Native plant cover type:* Forestland  
*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.

**47F—Petty gravelly loam,**  
**30 to 50 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 30 to 50 percent  
*Elevation:* 5,000 to 6,500 feet  
*Mean annual precipitation:* 36 to 45 inches  
*Frost-free period:* 40 to 50 days

**Composition**

*Major Components*  
Petty and similar soils: 85 percent
Minor Components
Areas of rubble land: 0 to 7 percent
Petty stony loam: 0 to 6 percent
Selway gravelly sandy loam: 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: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.5 inches

Rubble land
Definition: Areas covered by boulders or stones that support 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.

47G—Petty—Rubble land complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 5,000 to 6,500 feet
Mean annual precipitation: 36 to 45 inches
Frost-free period: 40 to 50 days

Composition
Major Components
Petty and similar soils: 60 percent
Rubble land: 25 percent

Minor Components
Areas of rock outcrop: 0 to 7 percent
Petty stony loam, bouldery: 0 to 5 percent
Petty stony loam: 0 to 2 percent
Selway gravelly sandy loam: 0 to 1 percent

Major Component Description
Petty
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.5 inches

Phillcher Series

Setting
Landform: Mountains and cirque basins
Parent material: Volcanic ash over glacial till or drift
Slope range: 8 to 70 percent
Elevation: 6,800 to 8,000 feet
Annual precipitation: 50 to 70 inches
Annual air temperature: 33 to 36 degrees F
Frost-free period: 20 to 40 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Eutrochrepts

Typical Pedon
Phillcher gravelly silt loam (mixed), 8 to 30 percent slopes, in an area of forestland, 750 feet north and 2,000 feet east of the southwest corner of sec. 11, T. 16 N., R. 22 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
E—0 to 2 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; moderately acid; clear wavy boundary.
Bw1—2 to 14 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, medium, and coarse roots; 30 percent pebbles; moderately acid; gradual wavy boundary.
2Bw2—14 to 26 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine, fine, and medium roots; 10 percent cobbles and 35 percent pebbles; moderately acid; gradual wavy boundary.

2Bw3—26 to 60 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few very fine and fine roots; 10 percent cobbles and 50 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 35 to 38 degrees F
Moisture control section: Between 8 and 24 inches
Thickness of the volcanic ash-influenced layer: 7 to 14 inches

Note: The E horizon is not present in some pedons.

E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 15 percent pebbles
Moist bulk density: 0.95 g/cm³ or less
Reaction: pH 5.6 to 6.0

Bw1 horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4
Clay content: 5 to 10 percent
Content of rock fragments: 15 to 35 percent pebbles
Acid oxalate extractable Al + 1/2 Fe: Greater than 1 percent
Moist bulk density: 0.95 g/cm³ or less
Reaction: pH 5.6 to 6.0

2Bw horizons
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 0 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 6.0

45D—Phillcher gravelly silt loam, 8 to 30 percent slopes

Setting

Landform: Mountains
Slope: 8 to 30 percent
Elevation: 6,800 to 8,000 feet
Mean annual precipitation: 50 to 70 inches
Frost-free period: 20 to 40 days

Composition

Major Components
Phillcher and similar soils: 85 percent

Minor Components
Holloway, cool: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over till or drift
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.

45G—Phillcher-Rock outcrop complex, 40 to 70 percent slopes

Setting

Landform: Cirque basins
Slope: 50 to 70 percent
Elevation: 6,800 to 8,000 feet
Mean annual precipitation: 50 to 70 inches
Frost-free period: 20 to 40 days
Composition

Major Components
Phillcher and similar soils: 45 percent
Rock outcrop: 40 percent

Minor Components
Holloway, cool: 0 to 9 percent
Areas of rubble land: 0 to 6 percent

Major Component Description

Phillcher
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.5 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

Management

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

Redlock Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate to 38 inches; slow below this depth
Landform: Lake plains and terraces
Parent material: Volcanic ash over glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation range: 2,200 to 2,800 feet
Annual precipitation: 28 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Coarse-loamy over clayey, mixed, active, frigid Andic Hapludalfs

Typical Pedon

Redlock silt loam, in an area of Redlock-Fernline silt loams, 0 to 4 percent slopes, in an area of forestland, 50 feet north and 2,550 feet west of the southeast corner of sec. 29, T. 24 N., R. 31 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; moderately acid; clear wavy boundary.
Bw—1 to 12 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak, medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; slightly acid; clear wavy boundary.
2E—12 to 17 inches; brown (10YR 5/3) very fine sandy loam, very pale brown (10YR 7/3) dry; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many fine and medium and common coarse roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; slightly acid; gradual wavy boundary.
2E/Bt—17 to 22 inches; E part (80 percent) is grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; B part (20 percent) is brown (7.5YR 5/2) loam, pinkish gray (7.5YR 6/2) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, nonplastic; many fine and medium and common coarse roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; few distinct clay films on faces of peds; moderately acid; clear wavy boundary.
2B/E—22 to 28 inches; B part (60 percent) is brown (7.5YR 5/2) loam, pinkish gray (7.5YR 6/2) dry; E part (40 percent) is grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky, nonplastic; few fine and common medium and coarse roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; few distinct clay films on faces of peds; slightly acid; clear wavy boundary.
3E and Bt—28 to 38 inches; E part (60 percent) is light brownish gray (10YR 6/2) loamy very fine sand, light gray (10YR 7/2) dry; weak fine granular structure; loose; nonsticky nonplastic; few fine and common medium and coarse roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; moderately acid; B part (40 percent) is brown (7.5YR 5/4) 1/2- to 2-inch thick very fine sandy
loam lamellae, light brown (7.5YR 6/4) dry; moderate medium platy structure; slightly hard, friable, slightly sticky, nonplastic; few fine and common medium and coarse roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; common distinct clay films on faces of peds; moderately acid; clear wavy boundary.

4Bt—38 to 44 inches; brown (7.5YR 5/4) clay, pinkish gray (7.5YR 7/2) dry; moderate coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few medium roots; few fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; many distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

5E and Bt—44 to 54 inches; E part (60 percent) is light brownish gray (10YR 6/2) loamy very fine sand, light gray (10YR 7/2) dry; weak fine granular structure; loose, nonsticky, nonplastic; few medium roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; moderately acid; B part (40 percent) is brown (7.5YR 5/4) 1- to 3-inch thick very fine sandy loam lamellae, light brown (7.5YR 6/4) dry; moderate medium platy structure; slightly hard, friable, slightly sticky, nonplastic; few medium roots; common fine and medium yellowish brown (10YR 5/6) prominent iron stains on faces of peds; common distinct clay films on faces of peds; moderately acid; clear wavy boundary.

6Bt—54 to 60 inches; brown (7.5YR 5/4) clay, pinkish gray (7.5YR 7/2) dry; moderate coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many distinct clay films on faces of peds; moderately acid.

**Range in Characteristics**

**Soil temperature:** 44 to 47 degrees F

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

**A horizon**
- Value: 4, 5, or 6 dry; 3, 4, or 5 moist
- Clay content: 5 to 15 percent
- Moist bulk density: 0.85 to 1.0 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
- Reaction: pH 5.1 to 6.5

**Bw horizon**
- Value: 5 or 6 dry; 4 or 5 moist
- Clay content: 5 to 15 percent
- Moist bulk density: 0.85 to 1.0 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent
- Reaction: pH 5.1 to 6.5

**2E horizon**
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Clay content: 5 to 15 percent
- Reaction: pH 5.1 to 6.5

**2E/Bt horizon**
- Hue: E part: 10YR; B part: 7.5YR or 10YR
- Value: E part: 5, 6, or 7 dry, 4, 5, or 6 moist;
  - B part: 4, 5, or 6 dry, 3, 4, or 5 moist
- Clay content: E part: 8 to 12 percent; B part: 12 to 18 percent
- Reaction: pH 5.1 to 6.5

**2Bt/E horizon**
- Hue: B part: 7.5YR or 10YR; E part: 10YR
- Value: B part: 4, 5, or 6 dry, 3, 4, or 5 moist;
  - E part: 5, 6, or 7 dry, 4, 5, or 6 moist
- Clay content: B part: 12 to 18 percent; E part: 8 to 12 percent
- Reaction: pH 5.1 to 6.5

**3E and Bt horizon**
- Hue: E part: 10YR; B part: 7.5YR or 10YR
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Clay content: E part: 8 to 12 percent; B part: 12 to 18 percent
- Reaction: pH 5.6 to 6.5

**4E horizon**
- Hue: B part: 7.5YR or 10YR; E part: 10YR
- Value: B part: 4, 5, or 6 dry, 3, 4, or 5 moist;
  - E part: 5, 6, or 7 dry, 4, 5, or 6 moist
- Clay content: E part: 8 to 12 percent; B part: 12 to 18 percent
- Reaction: pH 5.6 to 6.5

**5E and Bt horizon**
- Hue: E part: 10YR; B part: 7.5YR or 10YR
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Clay content: E part: 8 to 12 percent; B part: 12 to 18 percent
- Reaction: pH 5.6 to 6.5

**6Bt horizon**
- Hue: B part: 7.5YR or 10YR
- Value: B part: 4, 5, or 6 dry, 3, 4, or 5 moist
- Clay content: B part: 12 to 18 percent
- Reaction: pH 5.6 to 6.5

**Chroma:** 2, 4, or 6
Clay content: 40 to 60 percent
Reaction: pH 5.6 to 6.5

791B—Redlock-Fernline silt loams,
0 to 4 percent slopes

Setting

Landform:
- Redlock—Lake plains or terraces
- Fernline—Lake plains or terraces

Position on landform:
- Redlock—Treads
- Fernline—Treads

Slope:
- Redlock—0 to 4 percent
- Fernline—0 to 4 percent

Elevation: 2,200 to 2,700 feet

Mean annual precipitation: 28 to 34 inches

Frost-free period: 90 to 105 days

Composition

Major Components
Redlock and similar soils: 60 percent
Fernline and similar soils: 30 percent

Minor Components
Whitepine silt loam: 0 to 3 percent
Stargulch very fine sandy loam: 0 to 3 percent
Slopes greater than 4 percent: 0 to 1 percent

Major Component Description

Redlock
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.9 inches

Fernline
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 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.

791D—Redlock-Fernline silt loams,
4 to 15 percent slopes

Setting

Landform:
- Redlock—Lake plains or terraces
- Fernline—Lake plains or terraces

Position on landform:
- Redlock—Treads
- Fernline—Treads

Slope:
- Redlock—4 to 15 percent
- Fernline—4 to 15 percent

Elevation: 2,400 to 2,800 feet

Mean annual precipitation: 28 to 32 inches

Frost-free period: 90 to 105 days

Composition

Major Components
Redlock and similar soils: 60 percent
Fernline and similar soils: 30 percent

Minor Components
Iffgulch and similar soils: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description

Redlock
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.9 inches

Fernline
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 inches
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 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.

791E—Redlock-Fernline silt loams, 15 to 35 percent slopes

Setting

Landform:
• Redlock—Lake plains or terraces
• Fernline—Lake plains or terraces

Position on landform:
• Redlock—Dissected or incised treads
• Fernline—Treads

Slope:
• Redlock—15 to 35 percent
• Fernline—15 to 35 percent

Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Redlock and similar soils: 45 percent
Fernline and similar soils: 40 percent

Minor Components
Noxlin silt loam: 0 to 5 percent
Stargulch very fine sandy loam: 0 to 4 percent
Slopes greater than 35 percent: 0 to 4 percent
Iffgulch and similar soils: 0 to 2 percent

Major Component Description

Redlock
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.9 inches

Fernline
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over glaciolacustrine
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.3 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.

792D—Redlock-Fernline-Iffgulch complex, 0 to 15 percent slopes

Setting

Landform:
• Redlock—Lake plains or terraces
• Fernline—Lake plains or terraces
• Iffgulch—Drainageways

Position on landform:
• Redlock—Treads
• Fernline—Treads

Slope:
• Redlock—4 to 15 percent
• Fernline—4 to 15 percent
• Iffgulch—0 to 4 percent

Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 28 to 32 inches
Frost-free period: 90 to 105 days

Composition

Major Components
Redlock and similar soils: 45 percent
Fernline and similar soils: 35 percent
Iffgulch and similar soils: 10 percent

Minor Components
Stargulch very fine sandy loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

Major Component Description

Redlock
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained  
Dominant parent material: Volcanic ash over glaciolacustrine  
Native plant cover type: Forestland  
Flooding: None  
Available water capacity: Mainly 7.9 inches

Fernline  
Surface layer texture: Silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained  
Dominant parent material: Volcanic ash over glaciolacustrine  
Native plant cover type: Forestland  
Flooding: None  
Available water capacity: Mainly 10.3 inches

Iffgulch  
Surface layer texture: Clay  
Depth class: Very deep (more than 60 inches)  
Drainage class: Poorly drained  
Dominant parent material: Alluvium  
Native plant cover type: Forestland  
Flooding: Occasional  
Water table: Apparent  
Available water capacity: Mainly 9.9 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.

Remount Series

Depth class: Very deep  
Drainage class: Excessively drained  
Permeability: Moderate to the Bk horizon; very rapid in the Bk horizon  
Landform: Giant ripple marks  
Parent material: Alluvium  
Slope range: 2 to 25 percent  
Elevation: 2,800 to 3,000 feet  
Annual precipitation: 13 to 15 inches  
Annual air temperature: 41 to 45 degrees F  
Frost-free period: 105 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Calcic Argixerolls

Typical Pedon

Remount very gravelly loam, 2 to 12 percent slopes, in an area of pasture, 1,200 feet north and 50 feet east of the southwest corner of sec. 24, T. 20 N., R. 24 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; common fine and medium and few coarse roots; 40 percent pebbles; neutral; abrupt smooth boundary.

A2—7 to 11 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; many fine pores; 55 percent pebbles; neutral; clear smooth boundary.

Bt—11 to 15 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, friable, moderately sticky, slightly plastic; few fine and medium roots; many fine pores; common distinct clay films on faces of peds and on surface of pebbles; 75 percent pebbles; slightly alkaline; clear smooth boundary.

Btk—15 to 25 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; loose, slightly sticky, slightly plastic; trace of very fine and fine roots; few faint clay films on faces of peds and on surface of pebbles; 85 percent pebbles; common distinct limecasts on undersides of pebbles; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bk—25 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; loose, nonsticky, nonplastic; trace of very fine roots; 85 percent pebbles; common distinct limecasts mainly on undersides of pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Thickness of the mollic epipedon: 7 to 12 inches  
Depth to the Btk horizon: 10 to 24 inches
A horizons
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 35 to 60 percent—0 to 5 percent cobbles; 35 to 55 percent pebbles
Reaction: pH 6.6 to 7.8

Bt horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 20 to 35 percent
Content of rock fragments: 60 to 85 percent—0 to 10 percent cobbles; 60 to 75 percent pebbles
Reaction: pH 7.4 to 7.8

Btk horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 20 to 35 percent
Content of rock fragments: 75 to 95 percent—0 to 5 percent cobbles; 75 to 85 percent pebbles
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Clay content: 20 to 35 percent
Content of rock fragments: 75 to 90 percent—0 to 5 percent cobbles; 75 to 85 percent pebbles
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

97C—Remount very gravelly loam, 2 to 12 percent slopes

Setting
Landform: Giant ripple marks
Slope: 2 to 12 percent
Elevation: 2,800 to 3,000 feet
Mean annual precipitation: 13 to 15 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Remount and similar soils: 90 percent

Minor Components
Slopes greater than 12 percent: 0 to 5 percent
Minesinger gravelly loam: 0 to 4 percent
Belton silt loam: 0 to 1 percent

Major Component Description
Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
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.

97E—Remount very gravelly loam, 12 to 25 percent slopes

Setting
Landform: Giant ripple marks
Slope: 12 to 25 percent
Elevation: 2,800 to 3,000 feet
Mean annual precipitation: 13 to 15 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Remount and similar soils: 90 percent

Minor Components
Minesinger gravelly loam: 0 to 5 percent
Bowlake gravelly loam: 0 to 5 percent

Major Component Description
Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
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.

197C—Remount-Bowlake complex, 2 to 12 percent slopes

Setting

Landform:
- Remount—Giant ripple marks
- Bowlake—Giant ripple marks

Position on landform:
- Bowlake—Footslopes and toeslopes

Slope:
- Remount—2 to 12 percent
- Bowlake—2 to 8 percent

Elevation: 2,800 to 3,000 feet
Mean annual precipitation: 13 to 15 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Remount and similar soils: 55 percent
Bowlake and similar soils: 30 percent

Minor Components
Slopes greater than 12 percent: 0 to 9 percent
Minesinger gravelly loam: 0 to 6 percent

Major Component Description

Remount
Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Bowlake
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 7.7 inches

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

Repp Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate

Landform: Mountains
Parent material: Colluvium derived from calcareous argillite and quartzite
Slope range: 15 to 70 percent
Elevation: 3,200 to 5,000 feet
Annual precipitation: 18 to 21 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts

Typical Pedon
Repp gravelly loam, 35 to 60 percent slopes, in an area of forestland, 1,100 feet south and 1,300 feet west of the northeast corner of sec. 12, T. 16 N., R. 21 W.

Oi—1 inch to 0; mostly undecomposed forest litter.
E—0 to 7 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 20 percent pebbles; neutral; clear smooth boundary.

E/Bw—7 to 18 inches; E part: (80 percent) is light brownish gray (2.5Y 6/2) gravelly loam, brownish gray (2.5Y 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 30 percent pebbles; neutral; gradual wavy boundary.

Bw—18 to 36 inches; light yellowish brown (2.5Y 6/4) very gravelly loam, olive brown (2.5Y 4/4) moist; common fine and medium roots; 50 percent pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk—36 to 60 inches; light brownish gray (2.5Y 6/2) extremely gravelly loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky, slightly plastic; common fine and medium roots; 10 percent cobbles and 65 percent pebbles;
common distinct lime coatings on undersides of coarse fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Depth to the Bk horizon: 25 to 36 inches

E horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 20 to 35 percent—0 to 10 percent cobbles; 20 to 25 percent pebbles
Reaction: pH 6.1 to 7.8

E/Bw horizon
Hue: 2.5Y or 10YR
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 20 to 50 percent—0 to 10 percent cobbles; 20 to 40 percent pebbles
Reaction: pH 6.1 to 7.8

Bw horizon
Hue: 2.5Y or 10YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
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: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Content of rock fragments: 60 to 85 percent—0 to 10 percent cobbles; 60 to 75 percent pebbles
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.4 to 8.4

24E—Repp gravelly loam, 15 to 35 percent slopes

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 3,200 to 4,600 feet

Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Repp and similar soils: 85 percent

Minor Components
Eaglewing gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Slopes greater 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: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 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.

24F—Repp gravelly loam, 35 to 60 percent slopes

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,200 to 4,600 feet

Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Repp and similar soils: 90 percent

Minor Components
Eaglewing gravelly loam: 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: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 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.

26F—Repp gravelly loam, cool, 35 to 60 percent slopes

Setting
Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,200 to 5,000 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Repp and similar soils: 85 percent

Minor Components
Yourame gravelly loam: 0 to 5 percent
Eaglewing gravelly loam: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent

Major Component Description
Repp
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
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.

126G—Repp-Rock outcrop complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 3,200 to 5,000 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Repp and similar soils: 55 percent
Rock outcrop: 30 percent

Minor Components
Areas of rubble land: 0 to 9 percent
Finleypoint gravelly loam, dry: 0 to 6 percent

Major Component Description
Repp
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Calcareous argillite or quartzite colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

Revais Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 2,400 to 2,600 feet

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

Management
For management information about this map unit, see appropriate sections in Part II of this publication.
Annual precipitation: 13 to 18 inches  
Frost-free period: 95 to 125 days

**Taxonomic Class:** Coarse-silty, mixed, active, nonacid, frigid Typic Xerofluvents

**Typical Pedon**

Revais silt loam, 0 to 2 percent slopes, in an area of forestland, 550 feet north and 650 feet west of the southeast corner of sec. 35, T. 19 N., R. 24 W.

**A**—0 to 5 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium and few coarse roots; neutral; clear smooth boundary.

**C1**—5 to 14 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, slightly sticky, slightly plastic; many fine, common medium, and few coarse roots; neutral; clear smooth boundary.

**C2**—14 to 38 inches; light brownish gray (10YR 6/2) silt loam consisting of stratified silt loam and very fine sandy loam, grayish brown (10YR 5/2) moist; common fine faint strong brown (7.5YR 5/6) mottles; massive; soft, very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; neutral; gradual smooth boundary.

**C3**—38 to 60 inches; light brownish gray (10YR 6/2) silt loam consisting of stratified silt loam and very fine sandy loam, grayish brown (10YR 5/2) moist; common fine faint strong brown (7.5YR 5/6) mottles; massive; soft, very friable, slightly sticky, slightly plastic; few fine and coarse roots; neutral.

**Range in Characteristics**

- **Soil temperature:** 42 to 45 degrees F
- **Moisture control section:** Between 4 and 12 inches

**A horizon**

- Value: 5 or 6 dry; 3, 4, or 5 moist
- Chroma: 2 or 3
- Clay content: 5 to 15 percent
- Reaction: pH 6.6 to 7.3

**C1 horizon**

- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Silt loam or very fine sandy loam
- Clay content: 5 to 15 percent
- Reaction: pH 6.6 to 7.3

**C2 horizon**

- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Stratified silt loam or very fine sandy loam
- Clay content: 5 to 15 percent
- Reaction: pH 6.6 to 7.3

**C3 horizon**

- Value: 6 or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Stratified silt loam, loam, fine sandy loam, or very fine sandy loam
- Clay content: 5 to 15 percent; gravelly substratum phase has 0 to 10 percent clay below 40 inches
- Reaction: pH 6.6 to 7.3

94A—Revais silt loam, 0 to 2 percent slopes

**Setting**

- **Landform:** Flood plains
- **Slope:** 0 to 2 percent
- **Elevation:** 2,400 to 2,600 feet
- **Mean annual precipitation:** 13 to 15 inches
- **Frost-free period:** 105 to 125 days

**Composition**

**Major Components**

- Revais and similar soils: 90 percent

**Minor Components**

- Grantsdale silt loam: 0 to 5 percent
- Horseplains, rarely flooded: 0 to 5 percent

**Major Component Description**

- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Alluvium
- **Native plant cover type:** Forestland
- **Flooding:** Rare
- **Available water capacity:** Mainly 10.3 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.
151A—Revais silt loam, gravelly substratum, 0 to 2 percent slopes

**Setting**

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Elevation:* 2,400 to 2,600 feet  
*Mean annual precipitation:* 13 to 18 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**  
Revais and similar soils: 85 percent

**Minor Components**

Hewolf gravelly loam: 0 to 5 percent  
Horseplains, occasionally flooded: 0 to 5 percent  
Slopes greater than 2 percent: 0 to 3 percent  
Lamoose and similar soils: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forestland  
*Flooding:* Rare  
*Available water capacity:* Mainly 8.3 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.

200—Riverwash

**Composition**

**Major Components**

Riverwash: 90 percent

**Minor Components**

Horseplains, occasionally flooded: 0 to 8 percent  
Lamoose and similar soils: 0 to 2 percent

**Major Component Description**

*Definition:* Unstable, flooded areas of sandy or gravelly sediments that support little or no vegetation.

100—Rock outcrop-Rubble land complex

**Composition**

**Major Components**

Rock outcrop: 45 percent  
Rubble land: 40 percent

**Minor Components**

Hogsby cobbly loam: 0 to 9 percent  
Sharrott gravelly loam: 0 to 6 percent

**Major Component Description**

**Rock outcrop**

*Definition:* Exposures of argillite and quartzite.

**Rubble land**

*Definition:* Areas covered by boulders or stones that support little or no vegetation.

**Rockhill Series**

*Depth class:* Shallow  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Volcanic ash over residuum or colluvium  
*Slope range:* 8 to 60 percent  
*Elevation range:* 2,200 to 5,200 feet  
*Annual precipitation:* 24 to 32 inches  
*Annual air temperature:* 40 to 45 degrees F  
*Frost-free period:* 70 to 90 days

**Taxonomic Class:** Ashy-skeletal, mixed, superactive, frigid Lithic Udivitrands

**Typical Pedon**

Rockhill very gravelly silt loam, in an area of Rockhill-Mitten-Rock outcrop complex, 8 to 35 percent slopes, in an area of forestland, 800 feet south and 1,100 feet east of the northwest corner of sec. 19, T. 27 N., R. 28 W.

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

**A**—0 to 4 inches; brown (10YR 5/3) very gravelly silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent cobbles and 40 percent pebbles; slightly acid; clear smooth boundary.
Bw—4 to 13 inches; light yellowish brown (10YR 6/4) very gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent cobbles and 50 percent pebbles; slightly acid; clear wavy boundary.

2C—13 to 18 inches; light yellowish brown (10YR 6/4) extremely gravelly silt loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; few fine and medium roots; 10 percent cobbles and 65 percent pebbles; slightly acid; abrupt wavy boundary.

R—18 inches; fractured argillite and quartzite bedrock.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to bedrock: 10 to 20 inches
Depth to the 2C horizon: 10 to 19 inches
Volcanic glass content: 5 to 30 percent
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 2.0 percent
Phosphate retention: 25 to 75 percent

A horizon
Value: 4 or 5 dry; 2 or 3 moist
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 6.5

Bw horizon
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 4 or 6
Texture: Silt loam or loam
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles; 30 to 50 percent pebbles
Reaction: pH 5.6 to 6.5

2C horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Texture: Silt loam or loam
Clay content: 5 to 10 percent
Content of rock fragments: 60 to 85 percent—10 to 20 percent cobbles; 50 to 65 percent pebbles
Reaction: pH 5.6 to 6.5

631E—Rockhill-Mitten-Rock outcrop complex, 8 to 35 percent slopes

Setting

Landform:
• Rockhill—Mountains
• Mitten—Mountains

Slope:
• Rockhill—8 to 35 percent
• Mitten—8 to 35 percent

Elevation: 2,200 to 5,200 feet
Mean annual precipitation: 24 to 32 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rockhill and similar soils: 40 percent
Mitten and similar soils: 30 percent
Rock outcrop: 15 percent

Minor Components
Slopes greater than 35 percent: 0 to 10 percent
Holloway gravelly silt loam: 0 to 5 percent

Major Component Description

Rockhill
Surface layer texture: Very gravelly silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.7 inches

Mitten
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.2 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.
A typical soil description with range in characteristics is included, in alphabetical order, in this section.

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

632F—Rockhill-Rock outcrop complex, 15 to 60 percent slopes

Setting
Landform: Mountains
Slope: 15 to 60 percent
Elevation: 2,200 to 5,200 feet
Mean annual precipitation: 24 to 32 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Rockhill and similar soils: 45 percent
Rock outcrop: 40 percent

Minor Components
Holloway gravelly silt loam: 0 to 5 percent
Mitten gravelly silt loam: 0 to 5 percent
Rubble land: 0 to 5 percent

Major Component Description
Rockhill
Surface layer texture: Very gravelly silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.7 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

Round Butte Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 0 to 15 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Taxonomic Class: Fine, illitic, frigid Typic Natrixeralfs

Typical Pedon
Round Butte silty clay loam, 0 to 2 percent slopes, in an area of irrigated cropland, 2,100 feet north and 1,500 feet east of the southwest corner of sec. 12, T. 22 N., R. 24 W.

Ap—0 to 10 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common fine, medium, and coarse roots; slightly alkaline; abrupt smooth boundary.

Btn—10 to 18 inches; light yellowish brown (2.5Y 6/4) silty clay, olive brown (2.5Y 4/4) moist; strong fine and medium angular blocky structure; hard, firm, moderately sticky, very plastic; many fine and common medium roots; many prominent clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bkn—18 to 24 inches; very pale brown (2.5Y 7/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; faint 1/8- to 1/4-inch varves; hard, very firm, moderately sticky, very plastic; common fine and medium roots; common fine seams of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—24 to 38 inches; very pale brown (2.5Y 7/4) silty clay, light olive brown (2.5Y 5/4) moist; massive;
distinct ¼- to ½-inch varves; very hard, very firm, moderately sticky, very plastic; common fine and few medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C2—38 to 50 inches; white (2.5Y 8/2) silty clay loam, light brownish gray (2.5Y 6/2) moist; massive; loose, nonsticky, nonplastic; few fine roots; moderately alkaline; abrupt smooth boundary.

C3—50 to 60 inches; pale yellow (2.5Y 7/4) stratified silt loam and clay, light olive brown (2.5Y 5/4) moist; massive, distinct ¼- to ¼-inch varves; hard, very firm, moderately sticky, very plastic; slightly effervescent; moderately alkaline.

**Range in Characteristics**

**Soil temperature:** 42 to 47 degrees F  
**Moisture control section:** Between 4 and 12 inches  
**Depth to the varved lake sediments:** Greater than 20 inches  
**Depth to the Bkn horizon:** 10 to 20 inches  
**Note:** The C2 horizon is not present in all pedons.

**Ap horizon**  
Hue: 2.5Y or 10YR  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 27 to 35 percent  
Electrical conductivity (mmhos/cm): 0 to 2  
Sodium adsorption ratio: 4 to 13  
Reaction: pH 7.4 to 7.8

**Btn horizon**  
Hue: 2.5Y or 10YR  
Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2, 3, or 4  
Texture: Silty clay or silty clay loam  
Clay content: 35 to 60 percent  
Electrical conductivity (mmhos/cm): 2 to 4  
Sodium adsorption ratio: 13 to 40  
Reaction: pH 7.9 to 8.4

**Bkn horizon**  
Hue: 2.5Y or 10YR  
Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 3 or 4  
Texture: Silty clay or silty clay loam  
Clay content: 35 to 50 percent  
Calcium carbonate equivalent: 8 to 15 percent  
Electrical conductivity (mmhos/cm): 2 to 4  
Sodium adsorption ratio: 13 to 40  
Reaction: pH 7.9 to 8.4

**C1 horizon**  
Hue: 2.5Y or 10YR  
Value: 6 or 7 dry; 4 or 5 moist

**Chroma:** 2, 3, or 4  
**Texture:** Silty clay loam or silty clay  
**Clay content:** 30 to 50 percent  
**Electrical conductivity (mmhos/cm):** 1 to 3  
**Sodium adsorption ratio:** 13 to 30  
**Calcium carbonate equivalent:** 1 to 5 percent  
**Reaction:** pH 7.9 to 8.4

**C2 horizon**  
Hue: 2.5Y or 10YR  
Value: 6, 7, or 8 dry; 4, 5, or 6 moist  
Chroma: 2, 3, or 4  
Texture: Silty clay loam or silty clay  
Clay content: 30 to 50 percent  
Electrical conductivity (mmhos/cm): 1 to 3  
Sodium adsorption ratio: 13 to 30  
Calcium carbonate equivalent: 1 to 5 percent  
Reaction: pH 7.9 to 8.4

**C3 horizon**  
Hue: 2.5Y or 10YR  
Value: 6, 7, or 8 dry; 4, 5, or 6 moist  
Chroma: 2, 3, or 4  
Texture: Stratified silt loam or clay  
Clay content: 30 to 50 percent  
Electrical conductivity (mmhos/cm): 1 to 3  
Sodium adsorption ratio: 13 to 30  
Calcium carbonate equivalent: 1 to 5 percent  
Reaction: pH 7.9 to 8.4

**13A—Round Butte silty clay loam, 0 to 2 percent slopes**

**Setting**

**Landform:** Lake plains or terraces  
**Slope:** 0 to 2 percent  
**Elevation:** 2,500 to 3,000 feet  
**Mean annual precipitation:** 12 to 14 inches  
**Frost-free period:** 105 to 125 days

**Composition**

**Major Components**  
Round Butte and similar soils: 85 percent

**Minor Components**  
Sonyok silty clay loam: 0 to 9 percent  
Marklepass silty clay loam: 0 to 4 percent  
Slopes greater than 2 percent: 0 to 2 percent

**Major Component Description**

**Surface layer texture:** Silty clay loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
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.

113D—Round Butte-Irvine silty clay loams, 4 to 15 percent slopes

Setting

Landform:
- Round Butte—Lake plains or terraces
- Irvine—Lake plains or terraces

Position on landform:
- Round Butte—Dissected or incised treads
- Irvine—Dissected or incised treads

Slope:
- Round Butte—4 to 15 percent
- Irvine—4 to 15 percent

Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Round Butte and similar soils: 55 percent
Irvine and similar soils: 30 percent

Minor Components
Lonpine silt loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent
Areas of lake sediment outcrop: 0 to 5 percent

Major Component Description

Round Butte
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.7 inches

Irvine
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
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.

213A—Round Butte-Selow complex, 0 to 2 percent slopes

Setting

Landform:
- Round Butte—Lake plains or terraces
- Selow—Lake plains or terraces

Slope:
- Round Butte—0 to 2 percent
- Selow—0 to 2 percent

Elevation: 2,700 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Round Butte and similar soils: 45 percent
Selow and similar soils: 40 percent

Minor Components
Sonyok silty clay loam: 0 to 7 percent
Kerrdam silt loam: 0 to 5 percent
Slopes greater than 2 percent: 0 to 3 percent

Major Component Description

Round Butte
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.7 inches

Selow
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 9.4 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.

213B—Round Butte-Selow complex, 2 to 8 percent slopes

Setting

Landform:
- Round Butte—Lake plains or terraces
- Selow—Lake plains or terraces

Slope:
- Round Butte—2 to 8 percent
- Selow—2 to 8 percent

Elevation: 2,700 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Round Butte and similar soils: 45 percent
Selow and similar soils: 40 percent

Minor Components
Kerrdam silt loam: 0 to 5 percent
Sonyok silty clay loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

Major Component Description

Round Butte
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.7 inches

Selow
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 9.4 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.

Rumblecreek Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Moraines and mountains
Parent material: Alpine till and drift derived from argillite and quartzite
Slope range: 4 to 50 percent
Elevation: 3,200 to 5,000 feet
Annual precipitation: 25 to 34 inches
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Haplic Glossudalfs

Typical Pedon

Rumblecreek gravelly loam, 4 to 15 percent slopes, in an area of forestland, 2,700 feet south and 800 feet east of the northwest corner of sec. 4, T. 17 N., R. 22 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
E—0 to 8 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 20 percent pebbles; neutral; clear smooth boundary.
E/Bt—8 to 22 inches; E part (60 percent) is light brownish gray (10YR 6/2) gravelly loam, grayish brown (10YR 5/2) moist; B part (40 percent) is brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few medium and coarse roots; few faint clay films on faces of ped; 5 percent cobbles and 25 percent pebbles; slightly acid; gradual wavy boundary.
Bt/E—22 to 30 inches; B part (70 percent) is brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; E part (30 percent) is light brownish gray (10YR 6/2) very gravelly clay loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse roots; 10 percent cobbles and 35 percent pebbles; common distinct clay films on faces of ped; slightly acid; gradual wavy boundary.
Bt—30 to 60 inches; brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few medium and coarse roots; 40 percent pebbles; many distinct clay films on faces of ped; slightly acid.

Range in Characteristics

Soil temperature: 40 to 46 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the argillic horizon: Between 4 and 12 inches

E horizon

Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 30 percent pebbles
Reaction: pH 5.1 to 7.3

E/Bt horizon

Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles
Reaction: pH 5.1 to 7.3

Bt/E horizon

Hue: 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: 3 or 4; E part: 2 or 3
Texture: Loam or 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 7.8

Bt horizon

Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent pebbles
Reaction: pH 5.6 to 7.8

36D—Rumblecreek gravelly loam, 4 to 15 percent slopes

Setting

Landform: Moraines
Slope: 4 to 15 percent
220

Elevation: 3,400 to 5,000 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Wildgen gravelly loam: 0 to 5 percent
Bata gravelly silt loam: 0 to 5 percent
Slopes greater than 15 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: Alpine till or glacial drift
Native plant cover type: Forestland
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.

36E—Rumblecreek gravelly loam,
15 to 30 percent slopes

Setting

Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,400 to 5,000 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Wildgen gravelly loam: 0 to 5 percent
Bata gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)

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

Management

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

36F—Rumblecreek gravelly loam,
30 to 50 percent slopes

Setting

Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,400 to 4,600 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Wildgen gravelly loam: 0 to 5 percent
Bata gravelly silt loam: 0 to 5 percent
Slopes greater than 50 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: Alpine till or glacial drift
Native plant cover type: Forestland
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.
37D—Rumblecreek gravelly loam, dry, 4 to 15 percent slopes

Setting

Landform: Moraines
Slope: 4 to 15 percent
Elevation: 3,400 to 4,800 feet
Mean annual precipitation: 25 to 29 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Half moon silt loam, cool: 0 to 4 percent
Bata gravelly silt loam: 0 to 4 percent
Winfall gravelly loam: 0 to 4 percent
Slopes greater 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: Alpine till or glacial drift
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.

37E—Rumblecreek gravelly loam, dry, 15 to 30 percent slopes

Setting

Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,400 to 4,800 feet
Mean annual precipitation: 25 to 29 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Winfall gravelly loam: 0 to 5 percent
Half moon silt loam, cool: 0 to 5 percent
Slopes greater than 30 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: Alpine till or glacial drift
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.

37F—Rumblecreek gravelly loam, dry, 30 to 50 percent slopes

Setting

Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,400 to 4,800 feet
Mean annual precipitation: 25 to 29 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Winfall gravelly loam: 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: Well drained
Dominant parent material: Alpine till or glacial drift
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.

392D—Rumblecreek gravelly loam, 8 to 15 percent slopes, stony

Setting
Landform: Moraines
Position on landform: Treads
Slope: 8 to 15 percent
Elevation: 3,200 to 3,600 feet
Mean annual precipitation: 26 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Rumblecreek and similar soils: 85 percent

Minor Components
Slopes greater than 15 percent: 0 to 5 percent
Mollman gravelly loam: 0 to 5 percent
Half moon silt loam, cool: 0 to 3 percent
Bata gravelly silt loam: 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 or glacial drift
Native plant cover type: Forestland
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.

392E—Rumblecreek gravelly loam, 15 to 30 percent slopes, stony

Setting
Landform: Moraines
Position on landform: Risers

Composition
Major Components
Rumblecreek and similar soils: 90 percent
Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Mollman gravelly loam: 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 or glacial drift
Native plant cover type: Forestland
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.

Sacheen Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Very rapid
Landform: Stream terraces, escarpments, and sand dunes
Parent material: Eolian deposits
Slope range: 2 to 60 percent
Elevation: 2,400 to 2,800 feet
Annual precipitation: 14 to 20 inches
Frost-free period: 100 to 125 days

Taxonomic Class: Mixed, frigid Typic Xeropsamments

Typical Pedon
Sacheen loamy fine sand, dry, 2 to 8 percent slopes, in an area of pasture, 1,100 feet south and 2,500 feet west of the northeast corner of sec. 29, T. 20 N., R. 21 W.

A—0 to 8 inches; brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; loose,
nonsticky, nonplastic; common very fine and fine roots; neutral; clear smooth boundary.

C—8 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; neutral.

**Range in Characteristics**

**Soil temperature:** 42 to 46 degrees F

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

**A horizon**
- Value: 4 or 5 dry; 2, 3, or 4 moist
- Chroma: 2 or 3
- Texture: Loamy fine sand or fine sand
- Clay content: 3 to 8 percent
- Reaction: pH 6.1 to 7.3

**C horizon**
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 2 or 3
- Texture: Loamy fine sand or fine sand
- Clay content: 3 to 8 percent
- Reaction: pH 6.1 to 7.3

### 6B—Sacheen loamy fine sand, dry, 2 to 8 percent slopes

**Setting**

- **Landform:** Stream terraces
- **Position on landform:** Treads
- **Slope:** 2 to 8 percent
- **Elevation:** 2,400 to 2,800 feet
- **Mean annual precipitation:** 14 to 16 inches
- **Frost-free period:** 105 to 125 days

**Composition**

**Major Components**
- Sacheen and similar soils: 90 percent

**Minor Components**
- Selon fine sandy loam: 0 to 5 percent
- Sacheen fine sand: 0 to 3 percent
- Slopes greater than 8 percent: 0 to 2 percent

**Major Component Description**

- **Surface layer texture:** Loamy fine sand
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Somewhat excessively drained
- **Dominant parent material:** Eolian deposits
- **Native plant cover type:** Forestland
- **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.

### 41C—Sacheen loamy fine sand, 2 to 8 percent slopes

**Setting**

- **Landform:** Stream terraces
- **Position on landform:** Treads
Slope: 2 to 8 percent  
Elevation: 2,400 to 2,600 feet  
Mean annual precipitation: 16 to 18 inches  
Frost-free period: 105 to 125 days  

Composition

Major Components
Sacheen and similar soils: 90 percent

Minor Components
Selon fine sandy loam: 0 to 5 percent
Sacheen fine sand: 0 to 3 percent
Slopes greater than 8 percent: 0 to 2 percent

Major Component Description
Surface layer texture: Loamy fine sand  
Depth class: Very deep (more than 60 inches)  
Drainage class: Somewhat excessively drained  
Dominant parent material: Eolian deposits  
Native plant cover type: Forestland  
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.

41E—Sacheen loamy fine sand, 8 to 30 percent slopes

Setting
Landform: Stream terraces  
Position on landform: Dissected or incised treads  
Slope: 8 to 30 percent  
Elevation: 2,400 to 2,600 feet  
Mean annual precipitation: 16 to 18 inches  
Frost-free period: 105 to 125 days

Composition

Major Components
Sacheen and similar soils: 90 percent

Minor Components
Selon fine sandy loam: 0 to 5 percent
Sacheen fine sand: 0 to 3 percent
Selon, gravelly throughout: 0 to 2 percent

Major Component Description
Surface layer texture: Loamy fine sand  
Depth class: Very deep (more than 60 inches)  
Drainage class: Somewhat excessively drained  
Dominant parent material: Eolian deposits  
Native plant cover type: Forestland  
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.

41F—Sacheen loamy fine sand, 30 to 60 percent slopes

Setting
Landform: Escarpments  
Slope: 30 to 60 percent  
Elevation: 2,400 to 2,800 feet  
Mean annual precipitation: 15 to 17 inches  
Frost-free period: 105 to 125 days

Composition

Major Components
Sacheen and similar soils: 85 percent

Minor Components
Selon fine sandy loam: 0 to 5 percent
Selon, gravelly throughout: 0 to 5 percent
Sacheen fine sand: 0 to 5 percent

Major Component Description
Surface layer texture: Loamy fine sand  
Depth class: Very deep (more than 60 inches)  
Drainage class: Somewhat excessively drained  
Dominant parent material: Eolian deposits  
Native plant cover type: Forestland  
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.

106D—Sacheen-Dune land complex, 4 to 15 percent slopes

Setting
Landform:
• Sacheen—Sand dunes
• Dune land—Sand dunes
Slope: 4 to 15 percent
Elevation: 2,600 to 2,800 feet
Mean annual precipitation: 13 to 16 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Sacheen and similar soils: 50 percent
Dune land: 35 percent

Minor Components
Slopes greater than 15 percent: 0 to 9 percent
Selon, gravelly throughout: 0 to 6 percent

Major Component Description
Sacheen
Surface layer texture: Fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Eolian deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.0 inches

Dune land
Definition: Mounds, ridges, or hills of windblown sand that may be covered in vegetation or bare.

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

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

411E—Sacheen-Rock outcrop complex, 8 to 30 percent slopes

Setting
Landform: Stream terraces
Position on landform: Dissected or incised treads
Slope: 8 to 30 percent
Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 15 to 17 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Sacheen and similar soils: 60 percent
Rock outcrop: 30 percent

Minor Components
Selon, gravelly throughout: 0 to 6 percent
Sacheen fine sand: 0 to 2 percent
Selon fine sandy loam: 0 to 2 percent

Major Component Description
Sacheen
Surface layer texture: Loamy fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Eolian deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.1 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.
A typical soil description with range in characteristics is included, in alphabetical order, in this section.

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

Scotmont Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Lake plains and terraces
Parent material: Glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation range: 2,300 to 2,800 feet
Annual precipitation: 24 to 28 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 100 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Vitrandic Hapludalfs

**Typical Pedon**

Scotmont fine sandy loam, 4 to 15 percent slopes, in an area of forestland, 800 feet south and 1,500 feet west of the northeast corner of sec. 6, T. 21 N., R. 29 W.

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

**A**—0 to 7 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; moderately acid; gradual wavy boundary.

**E**—7 to 14 inches; brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; moderately acid; gradual wavy boundary.

**E and Bt1**—14 to 28 inches; E part (90 percent) is brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry; massive; soft, very friable, nonsticky, nonplastic; common fine, medium, and coarse roots; B part (10 percent) is yellowish brown (10YR 5/4) 1/8- to 3/8-inch thick fine sandy loam lamellae, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many clay films bridging sand grains; common medium and few coarse roots; slightly acid; clear wavy boundary.

**E and Bt3**—43 to 60 inches; E part (50 percent) is brown (10YR 5/3) loamy fine sand, very pale brown (10YR 7/3) dry; massive; soft, very friable, nonsticky, nonplastic; common medium and few coarse roots; B part (50 percent) is yellowish brown (10YR 5/4) 1/8- to 2-inch thick fine sandy loam lamellae, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many clay films bridging sand grains; common medium and few coarse roots; slightly acid.

**Range in Characteristics**

**Soil temperature:** 44 to 47 degrees F

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

**A horizon**
- Value: 5 or 6 dry; 4 or 5 moist
- Clay content: 4 to 10 percent
- Moist bulk density: 1.0 to 1.40 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
- Reaction: pH 5.1 to 6.5

**E horizon**
- Value: 6 or 7 dry; 5 or 6 moist
- Clay content: 4 to 10 percent
- Moist bulk density: 1.0 to 1.40 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
- Reaction: pH 5.1 to 6.5

**E and Bt1 horizon**
- Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5, 6, or 7 dry, 4 or 5 moist
- Texture: E part: Loamy fine sand or fine sandy loam; B part: Fine sandy loam
- Clay content: E part: 4 to 10 percent; B part: 8 to 15 percent
- Reaction: pH 5.6 to 6.5

**E and Bt2 horizon**
- Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5, 6 or 7 dry, 4 or 5 moist
- Texture: E part: Loamy fine sand or loamy very fine sand; B part: Fine sandy loam or very fine sandy loam
- Clay content: E part: 4 to 10 percent; B part: 8 to 15 percent
- Reaction: pH 5.6 to 6.5

**E and Bt3 horizon**
- Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5, 6 or 7 dry, 4 or 5 moist
- Texture: E part: Loamy fine sand; B part: Fine sandy loam
Clay content: E part: 4 to 10 percent; B part: 8 to 15 percent
Reaction: pH 5.6 to 6.5

61B—Scotmont fine sandy loam, 0 to 4 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 100 to 115 days

Composition

Major Components
Scotmont and similar soils: 85 percent

Minor Components
Lionwood loam: 0 to 9 percent
Whitepine silt loam: 0 to 3 percent
Slopes greater than 4 percent: 0 to 3 percent

Major Component Description
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
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.

61D—Scotmont fine sandy loam, 4 to 15 percent slopes

Setting
Landform: Lake plains or terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,300 to 2,800 feet
Mean annual precipitation: 24 to 28 inches
Frost-free period: 100 to 115 days

Comosition

Major Components
Scotmont and similar soils: 85 percent

Minor Components
Lionwood loam: 0 to 8 percent
Slopes greater than 15 percent: 0 to 4 percent
Whitepine silt loam: 0 to 3 percent

Major Component Description
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
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.

Selon Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Stream terraces and escarpments
Parent material: Alluvium
Slope range: 0 to 60 percent
Elevation range: 2,300 to 2,900 feet
Annual precipitation: 15 to 24 inches
Annual air temperature: 40 to 45 degrees F
Frost-free period: 100 to 125 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Typic Haploxerepts

Typical Pedon
Selon fine sandy loam, 4 to 15 percent slopes, in an area of forestland, 900 feet south and 300 feet west of the northeast corner of sec. 5, T. 19 N., R. 26 W.

Oi—1 inch to 0; partially decomposed organic matter.
A—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; neutral; clear smooth boundary.
E—3 to 15 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; slightly acid; gradual wavy boundary.

E/Bw—15 to 50 inches; E part (85 percent) is very pale brown (10YR 7/3) fine sandy loam, yellowish brown (10YR 5/4) moist; B part (15 percent) is brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few medium and coarse roots; slightly acid; gradual wavy boundary.

C—50 to 60 inches; very pale brown (10YR 7/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; few medium and coarse roots; moderately acid.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 8 and 24 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

E horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3 or 4
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

E/Bw horizon
Hue: 10YR or 2.5Y
Value: E part: 5, 6, or 7 dry; 4, 5, or 6 moist; B part: 4 or 5 dry, 4 or 5 moist
Chroma: E part: 3 or 4; B part: 3, 4, 5, or 6
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

C horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3 or 4
Clay content: 10 to 18 percent
Reaction: pH 5.6 to 7.3

42B—Selon fine sandy loam,
0 to 4 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,400 to 2,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Selon and similar soils: 85 percent

Minor Components
McCollum fine sandy loam: 0 to 5 percent
Bemishave loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Fine 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 8.1 inches

Management

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

42D—Selon fine sandy loam,
4 to 15 percent slopes

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 4 to 15 percent
Elevation: 2,400 to 2,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 105 to 125 days
Composition

**Major Components**
Selon and similar soils: 85 percent

**Minor Components**
Sachseon loamy fine sand: 0 to 5 percent
Bemishave loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent

**Major Component Description**
*Surface layer texture:* Fine 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 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.

421B—Selon fine sandy loam, moist, 0 to 4 percent slopes

Setting

*Landform:* Stream terraces  
*Position on landform:* Treads  
*Slope:* 0 to 4 percent  
*Elevation:* 2,300 to 2,800 feet  
*Mean annual precipitation:* 18 to 20 inches  
*Frost-free period:* 100 to 120 days

Composition

**Major Components**
Selon and similar soils: 85 percent

**Minor Components**
Slopes greater than 4 percent: 0 to 5 percent  
Scotmont fine sandy loam: 0 to 5 percent  
Selon, gravelly throughout: 0 to 3 percent  
McCollum fine sandy loam: 0 to 2 percent

**Major Component Description**
*Surface layer texture:* Fine 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 8.1 inches

421D—Selon fine sandy loam, moist, 4 to 15 percent slopes

Setting

*Landform:* Stream terraces  
*Position on landform:* Treads  
*Slope:* 4 to 15 percent  
*Elevation:* 2,300 to 2,800 feet  
*Mean annual precipitation:* 18 to 20 inches  
*Frost-free period:* 100 to 120 days

Composition

**Major Components**
Selon and similar soils: 85 percent

**Minor Components**
Scotmont fine sandy loam: 0 to 5 percent  
Slopes greater than 15 percent: 0 to 5 percent  
Selon, gravelly throughout: 0 to 3 percent  
McCollum fine sandy loam: 0 to 2 percent

**Major Component Description**
*Surface layer texture:* Fine 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 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.

### 421E—Selon fine sandy loam, moist, 15 to 30 percent slopes

**Setting**

*Landform*: Stream terraces  
*Position on landform*: Dissected or incised treads  
*Slope*: 15 to 30 percent  
*Elevation*: 2,300 to 2,800 feet  
*Mean annual precipitation*: 18 to 20 inches  
*Frost-free period*: 100 to 120 days

**Composition**

**Major Components**  
Selon and similar soils: 85 percent

**Minor Components**  
Slopes greater than 30 percent: 0 to 5 percent  
Sacheen loamy fine sand: 0 to 5 percent  
Selon, gravelly throughout: 0 to 5 percent

**Major Component Description**

Selon  
*Surface layer texture*: Fine 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 8.1 inches

**Bemishave**  
*Surface layer texture*: Loam  
*Depth class*: Very deep (more than 60 inches)  
*Drainage class*: Well drained  
*Dominant parent material*: Lacustrine deposits  
*Native plant cover type*: Forestland  
*Flooding*: None  
*Available water capacity*: Mainly 10.4 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.

### 422F—Selon-Bemishave complex, 15 to 60 percent slopes

**Setting**

*Landform*:  
  *Selon*—Escarps  
  *Bemishave*—Escarps

**Composition**

**Major Components**  
Selon and similar soils: 45 percent  
Bemishave and similar soils: 40 percent

**Minor Components**  
McCollum fine sandy loam: 0 to 8 percent  
Bigarm gravelly loam: 0 to 6 percent  
Slopes greater than 60 percent: 0 to 1 percent

**Major Component Description**

**Selon**  
*Surface layer texture*: Fine 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 8.1 inches

**Bemishave**  
*Surface layer texture*: Loam  
*Depth class*: Very deep (more than 60 inches)  
*Drainage class*: Well drained  
*Dominant parent material*: Lacustrine deposits  
*Native plant cover type*: Forestland  
*Flooding*: None  
*Available water capacity*: Mainly 10.4 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.

### 842E—Selon fine sandy loam, 15 to 30 percent slopes

**Setting**

*Landform*: Stream terraces  
*Position on landform*: Dissected or incised treads
Slope: 15 to 30 percent
Elevation: 2,400 to 2,900 feet
Mean annual precipitation: 16 to 18 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Selon and similar soils: 85 percent

Minor Components
Sacheen loamy fine sand: 0 to 5 percent
Bemishave loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Fine 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 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.

Selow Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow to 2Bk horizon; moderate below this depth
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 0 to 15 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Taxonomic Class: Fine-silty, illitic, frigid Typic Natrixeralfs

Typical Pedon

Selow silt loam, in an area of Dryfork-Selow silt loams, 0 to 4 percent slopes, in an area of pasture, 50 feet south and 300 feet east of the northwest corner of sec. 13, T. 21 N., R. 23 W.

Ap—0 to 8 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; many fine and common medium roots; many very fine and fine discontinuous tubular pores; slightly alkaline; abrupt smooth boundary.

Btk—8 to 14 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/3) moist; weak medium prismatic structure parting to strong fine and medium angular blocky; very hard, firm, very sticky, very plastic; many fine and few medium roots; few very fine discontinuous tubular pores; many prominent clay films on faces of peds and in pores; strongly alkaline; clear smooth boundary.

Btk—14 to 20 inches; very pale brown (10YR 7/4) silty clay loam, yellowish brown (10YR 5/4) moist;
Soil Survey

strong medium subangular blocky structure; hard, firm, moderately sticky, very plastic; common fine roots; few faint clay films on faces of peds; common fine masses of lime; violently effervescent; strongly alkaline; abrupt smooth boundary.

2Bk—20 to 28 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; disseminated lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

2C—28 to 60 inches; light gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; disseminated lime; slightly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Btnk horizon: 12 to 20 inches
Depth to lithologic discontinuity: 18 to 30 inches
Notes: When uncultivated, the Ap horizon is designated an E horizon. The Btnk horizon may contain faint to distinct lake varves. The 2Bk horizon may not be present in all profiles.

Ap horizon
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 6.6 to 7.8

Btn horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Clay content: 27 to 35 percent
Electrical conductivity (mmhos/cm): 1 to 4
Sodium adsorption ratio: 13 to 40
Reaction: pH 7.9 to 9.0

Btnk horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 27 to 40 percent
Calcium carbonate equivalent: 5 to 10 percent
Electrical conductivity (mmhos/cm): 1 to 4
Sodium adsorption ratio: 13 to 40
Reaction: pH 8.5 to 9.6

2Bk horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam or very fine sandy loam
Clay content: 0 to 10 percent
Calcium carbonate equivalent: 5 to 10 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 30
Reaction: pH 8.5 to 9.6

2C horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam, very fine sandy loam, or loamy very fine sand
Clay content: 0 to 10 percent
Calcium carbonate equivalent: 1 to 5 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 8.5 to 9.0

Selway Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Colluvium
Slope range: 8 to 30 percent
Elevation: 4,400 to 5,400 feet
Annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lamellic Eutrudepts

Typical Pedon

Selway gravelly sandy loam, 8 to 30 percent slopes, in an area of forestland, 2,200 feet south and 300 feet east of the northwest corner of sec. 29, T. 18 N., R. 23 W.

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

E—0 to 8 inches; light brownish gray (10YR 6/2) gravelly 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; common very fine pores; 30 percent pebbles; slightly acid; gradual wavy boundary.

E/Bw—8 to 26 inches; E part (70 percent) is pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; B part (30 percent) is light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic;
many very fine, fine, and medium and few coarse roots; common very fine pores; 45 percent pebbles; moderately acid; clear wavy boundary. BC—28 to 60 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few medium and coarse roots; 55 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 42 to 46 degrees F
Moisture control section: Between 8 and 24 inches

E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2, 3, or 4
Clay content: 5 to 15 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

E/Bw horizon
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 4, 5, or 6 dry, 3 or 4 moist
Chroma: E part: 3 or 4; B part: 4 or 6
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 75 percent pebbles
Reaction: pH 5.6 to 6.5

BC horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3, 4, or 6
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 80 percent—0 to 10 percent cobbles; 35 to 70 percent pebbles
Reaction: pH 5.6 to 6.5

89E—Selway gravelly sandy loam, 8 to 30 percent slopes

Setting

Landform: Mountains
Position on landform: Backslopes, footslopes, and side slopes
Slope: 8 to 30 percent
Elevation: 4,400 to 5,400 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition

Minor Components
Tevis gravelly loam, dry: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent
Selway stony sandy loam: 0 to 4 percent
Selway, bouldery: 0 to 1 percent

Major Component Description

Surface layer texture: Gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Forestland
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.

Sharrott Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Residuum and colluvium derived from argillite and quartzite
Slope range: 8 to 85 percent
Annual precipitation: 18 to 21 inches
Elevation: 2,500 to 5,200 feet
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustepts

Typical Pedon

Sharrott gravelly loam, in an area of Winkler-Sharrott-Rubble land complex, 40 to 85 percent slopes, in an area of forestland, 1,300 feet north and 300 feet west of the southeast corner of sec. 15, T. 18 N., R. 24 W.

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

A—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine and common medium roots;
Range in Characteristics

Soil temperature: 44 to 47 degrees F  
Moisture control section: Between 8 and 24 inches  
Depth to bedrock: 10 to 20 inches  

A horizon
- Value: 4 or 5 dry; 3 or 4 moist  
- Chroma: 2 or 3  
- Clay content: 10 to 15 percent  
- Content of rock fragments: 15 to 35 percent—0 to 5 percent stones and cobbles; 15 to 30 percent pebbles  
- Reaction: pH 5.6 to 6.5  

Bw horizon
- Value: 6 or 7 dry; 4 or 5 moist  
- Chroma: 2, 3, or 4  
- Clay content: 10 to 15 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  

BC horizon
- Value: 6 or 7 dry; 5 or 6 moist  
- Chroma: 2 or 3  
- Clay content: 10 to 15 percent  
- Content of rock fragments: 65 to 80 percent—5 to 10 percent cobbles; 60 to 70 percent pebbles  
- Reaction: pH 5.6 to 6.5  

80F—Sharrott-Rubble land-Rock outcrop complex, 15 to 60 percent slopes

Setting

Landform: Mountains  
Slope: 15 to 60 percent  
Elevation: 2,500 to 4,200 feet  

Mean annual precipitation: 18 to 20 inches  
Frost-free period: 80 to 90 days  

Composition

Major Components
- Sharrott and similar soils: 45 percent  
- Rock outcrop: 25 percent  

Minor Components
- Sharrott gravelly loam: 0 to 6 percent  

Major Component Description

Sharrott
- Surface layer texture: Gravelly loam  
- Depth class: Shallow (10 to 20 inches)  
- Drainage class: Well drained  
- Dominant parent material: Colluvium or residuum  
- Native plant cover type: Forestland  
- Flooding: None  
- Available water capacity: Mainly 1.2 inches

Rubble land
- Definition: Areas covered by boulders or stones that support little or no vegetation.

Rock outcrop
- Definition: Exposures of argillite and quartzite.

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

Management

For management information about this map unit, see appropriate sections in Part II of this publication.
Minor Components
Winkler gravelly loam, cool: 0 to 10 percent

Major Component Description
Sharrott
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium or residuum
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.1 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

Rubble land
Definition: Areas covered by boulders or stones that support 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.

Sonyok Series
Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Very slow
Landform: Lake plains and terraces
Parent material: Lacustrine deposits
Slope range: 0 to 4 percent
Elevation: 2,600 to 2,900 feet
Annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Taxonomic Class: Fine, mixed, active, nonacid, frigid
Aeric Halaquepts

Typical Pedon
Sonyok silty clay loam, 0 to 4 percent slopes, in an area of pasture, 2,540 feet south and 1,320 feet west of the northeast corner of sec. 2, T. 21 N., R. 24 W.

Oi—3 inches to 0; undecomposed and partially decomposed matted roots.
Ap—0 to 7 inches; grayish brown (10YR 5/2) silty clay loam, light gray (10YR 7/2) dry; many fine distinct light olive brown (2.5Y 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine, fine, and medium roots; neutral; clear smooth boundary.

Bwn1—7 to 15 inches; brown (10YR 4/3) silty clay, very pale brown (10YR 7/3) dry; many fine distinct light olive brown (2.5Y 5/6) redox concentrations; strong medium angular blocky structure; very hard, very firm, moderately sticky, moderately plastic; common fine and medium roots; slightly alkaline; clear smooth boundary.

Bwn2—15 to 25 inches; yellowish brown (10YR 5/4) silty clay, pale brown (10YR 6/3) dry; many fine distinct light olive brown (2.5Y 5/6) redox concentrations; moderate coarse subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few fine roots; slightly alkaline; abrupt smooth boundary.

C—25 to 60 inches; pale brown (10YR 6/3) silty clay, light gray (10YR 7/2) dry; massive, distinct 1/8- to 1/4-inch varves; very hard, very firm, moderately sticky, moderately plastic; moderately alkaline.

Range in Characteristics
Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the seasonal high water table: Ponded to 12 inches

Depth to the varved lake sediments: 20 to 60 inches

Ap horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 1 or 2
Clay content: 27 to 40 percent
Electrical conductivity (mmhos/cm): 0 to 1
Sodium adsorption ratio: 4 to 13
Reaction: pH 6.6 to 7.3

Bwn1 horizons
Hue: 10YR or 2.5Y
Value: 4 or 5 moist; 6 or 7 dry
Chroma: 3, 4, or 6
Texture: Silty clay or silty clay loam
Clay content: 35 to 60 percent
Electrical conductivity (mmhos/cm): 1 to 4
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.4 to 7.8

C horizon
Value: 5, 6, or 7 moist; 6, 7, or 8 dry
Texture: Silty clay, clay, or silty clay loam
Clay content: 35 to 50 percent
Electrical conductivity (mmhos/cm): 1 to 3
Sodium adsorption ratio: 4 to 30
Reaction: pH 7.9 to 8.4
513A—Sonyok silty clay loam, 0 to 4 percent slopes

Setting
Landform: Lake plains or terraces
Slope: 0 to 4 percent
Elevation: 2,600 to 2,900 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition
Major Components
Sonyok and similar soils: 85 percent
Minor Components
Round Butte silty clay loam: 0 to 9 percent
Bolack silt loam: 0 to 6 percent

Major Component Description
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Lacustrine deposits
Flooding: Frequent
Ponding: Long
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.3 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.

Stargulch Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Volcanic ash over alluvium or outwash
Slope range: 0 to 15 percent
Annual precipitation: 30 to 34 inches
Elevation range: 2,200 to 2,600 feet
Annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 105 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Andic Hapludalfs

Typical Pedon
Stargulch very fine sandy loam, 0 to 4 percent slopes, in an area of forestland, 1,200 feet north and 1,800 feet west of the southeast corner of sec. 27, T. 27 N., R. 34 W.

A—0 to 2 inches; dark brown (10YR 3/3) very fine sandy loam, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; moderately acid; clear wavy boundary.

Bw1—2 to 8 inches; dark yellowish brown (10YR 4/4) very fine sandy loam, yellowish brown (10YR 5/6) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; moderately acid; clear wavy boundary.

Bw2—8 to 13 inches; dark yellowish brown (10YR 4/4) very fine sandy loam, brownish yellow (10YR 6/6) dry; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; moderately acid; clear wavy boundary.

2E and Bt1—13 to 25 inches; E part (90 percent) is brown (10YR 5/3) loamy fine sand, pale brown (10YR 6/3) dry; B part (10 percent) is dark yellowish brown (10YR 4/4) fine sandy loam lamellae, 1/4- to 3/8-inch thick, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine, medium, and coarse roots; moderately acid; gradual wavy boundary.

2E and Bt2—25 to 44 inches; E part (70 percent) is brown (10YR 5/3) loamy fine sand, pale brown (10YR 6/3) dry; massive; soft, very friable, nonsticky, nonplastic; common fine and medium and few coarse roots; moderately acid; B part (30 percent) is dark yellowish brown (10YR 4/4) 1- to 2-inch thick fine sandy loam lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many clay films bridging sand grains; common fine and medium, and few coarse roots; moderately acid; gradual wavy boundary.

2Bt and E—44 to 60 inches; B part (60 percent) is dark yellowish brown (10YR 4/4) 1- to 2-inch thick fine sandy loam lamellae, light yellowish brown (10YR 6/4) dry; moderate medium subangular
blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many clay films bridging sand grains; few fine, medium, and coarse roots; moderately acid; E part (40 percent) is brown (10YR 5/3) loamy fine sand, pale brown (10YR 6/3) dry; massive; soft, very friable, nonsticky, nonplastic; few fine, medium, and coarse roots; moderately acid.

**Range in Characteristics**

**Soil temperature:** 44 to 47 degrees F  
**Moisture control section:** Between 8 and 24 inches

**A horizon**  
Value: 4, 5, or 6 dry; 3, 4, or 5 moist  
Clay content: 0 to 6 percent  
Moist bulk density: 0.85 to 1.0 g/cm³  
Acid oxalate extractable Al + 1/2 Fe: 1.0 to 1.5 percent  
Reaction: pH 5.1 to 6.5

**Bw horizons**  
Value: 5 or 6 dry; 4 or 5 moist  
Clay content: 0 to 6 percent  
Moist bulk density: 0.85 to 1.0 g/cm³  
Acid oxalate extractable Al + 1/2 Fe: 1 to 2 percent  
Reaction: pH 5.1 to 6.5

**2E and Bt1 horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Clay content: E part: 0 to 6 percent; B part: 8 to 12 percent  
Reaction: pH 5.6 to 6.5

**2E and Bt2 horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Clay content: E part: 0 to 6 percent; B part: 8 to 12 percent  
Reaction: pH 5.6 to 6.5

**2Bt and E horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Clay content: B part: 8 to 12 percent; E part: 0 to 6 percent  
Reaction: pH 5.6 to 6.5

**91D—Stargulch very fine sandy loam, 4 to 15 percent slopes**

**Setting**

**Landform:** Stream terraces  
**Position on landform:** Treads  
**Slope:** 4 to 15 percent  
**Elevation:** 2,200 to 2,600 feet  
**Mean annual precipitation:** 30 to 34 inches  
**Frost-free period:** 90 to 105 days

**Composition**

**Major Components**  
Stargulch and similar soils: 85 percent

**Minor Components**  
Berray silt loam: 0 to 5 percent  
Tamarack moist: 0 to 5 percent  
Slopes greater than 15 percent: 0 to 5 percent

**Major Component Description**

**Surface layer texture:** Very fine sandy loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Well drained  
**Dominant parent material:** Volcanic ash over alluvium or outwash  
**Native plant cover type:** Forestland  
**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.

**891B—Stargulch very fine sandy loam, 0 to 4 percent slopes**

**Setting**

**Landform:** Stream terraces  
**Position on landform:** Treads  
**Slope:** 0 to 4 percent  
**Elevation:** 2,200 to 2,600 feet  
**Mean annual precipitation:** 30 to 34 inches  
**Frost-free period:** 90 to 105 days

**Composition**

**Major Components**  
Stargulch and similar soils: 90 percent

**Minor Components**  
Berray silt loam: 0 to 4 percent  
Tamarack moist: 0 to 4 percent  
Slopes greater than 4 percent: 0 to 2 percent

**Major Component Description**

**Surface layer texture:** Very fine sandy loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Well drained  
**Dominant parent material:** Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

Stevie Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderate to the 2E/Bw horizon; moderately rapid below this depth
Landform: Mountains
Parent material: Volcanic ash over colluvium
Slope range: 15 to 70 percent
Elevation range: 2,500 to 5,000 feet
Annual precipitation: 28 to 40 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Ashy over loamy-skeletal, mixed, superactive, frigid Typic Udivitrands

Typical Pedon

Stevie gravelly silt loam, 35 to 60 percent slopes, in an area of forestland, 1,400 feet north and 400 feet east of the southwest corner of sec. 35, T. 26 N., R 32 W.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 1 inch; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many fine and medium and common very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; abrupt wavy boundary.

Bw1—1 to 7 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure parting to weak fine and medium granular; soft, very friable, nonsticky, nonplastic; many fine and medium and common very fine, fine, medium, and coarse roots; 5 percent cobbles and 15 percent pebbles; slightly acid; gradual wavy boundary.

Bw2—7 to 17 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky, nonplastic; common fine, medium, and coarse roots; 5 percent cobbles and 25 percent pebbles; moderately acid; abrupt wavy boundary.

2E/Bw—17 to 42 inches; E part (80 percent) is grayish brown (10YR 5/2) very cobbly sandy loam, light gray (10YR 7/2) dry; B part (20 percent) is brown (10YR 5/3) very cobbly sandy loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; slightly hard, friable, nonsticky, slightly plastic; common fine, medium, and coarse roots; 20 percent cobbles and 30 percent pebbles; slightly acid; gradual wavy boundary.

2C—42 to 60 inches; grayish brown (10YR 5/2) extremely cobbly sandy loam, light gray (10YR 7/2) dry; massive; slightly hard, friable, nonsticky, slightly plastic; few medium and coarse roots; 30 percent cobbles and 40 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Volcanic glass content in the 0.02 to 2.0 mm fraction: 12 to 20 percent
Acid-oxalate extractable Al + 1/2 Fe: 1.60 to 2.25 percent
Phosphate retention: 25 to 75
15-bar water retention on air-dried samples: 8 to 12 percent

A horizon
Value: 4 or 5 dry; 2, 3, or 4 moist
Chroma: 2 or 3
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

Bw1 horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3, 4, or 6
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 15 to 30 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
Reaction: pH 5.6 to 6.5

Bw2 horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3, 4, or 6
Clay content: 2 to 10 percent
Moist bulk density: 0.85 to 1.00 g/cm³
Content of rock fragments: 15 to 30 percent—0 to 5 percent cobbles; 15 to 25 percent pebbles
Reaction: pH 5.6 to 6.5

2E/Bw horizon
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 2, 3, or 4
Clay content: 2 to 10 percent
Content of rock fragments: 45 to 60 percent—15 to 20 percent cobbles; 30 to 40 percent pebbles
Reaction: pH 5.6 to 6.5

2C horizon
Value: 4 or 5 dry; 6 or 7 moist
Chroma: 2, 3, or 4
Clay content: 2 to 10 percent
Content of rock fragments: 60 to 80 percent—20 to 30 percent cobbles; 40 to 50 percent pebbles
Reaction: pH 5.6 to 6.5

87F—Stevie gravelly silt loam, 35 to 60 percent slopes

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

871G—Stevie-Rock outcrop complex, 40 to 70 percent slopes

Setting
Landform: Mountains
Slope: 40 to 70 percent
Elevation: 2,500 to 5,000 feet
Mean annual precipitation: 28 to 40 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Stevie and similar soils: 60 percent
Rock outcrop: 30 percent

Minor Components
Rockhill: 0 to 5 percent
Areas of rubble land: 0 to 5 percent

Major Component Description
Stevie
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Volcanic ash over colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

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

887E—Stevie gravelly silt loam, 15 to 35 percent slopes

Setting
Landform: Mountains
Slope: 15 to 35 percent
Elevation: 2,500 to 5,000 feet  
Mean annual precipitation: 28 to 40 inches  
Frost-free period: 70 to 90 days

**Composition**

**Major Components**  
Stevie and similar soils: 90 percent

**Minor Components**  
Slopes greater than 35 percent: 0 to 5 percent  
Mitten gravelly silt loam: 0 to 5 percent

**Major Component Description**  
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Excessively drained  
Dominant parent material: Volcanic ash over 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.

**Tallcreek Series**

Depth class: Very deep  
Drainage class: Moderately well drained  
Permeability: Slow  
Landform: Stream terraces  
Parent material: Glaciolacustrine deposits  
Slope range: 0 to 4 percent  
Elevation range: 3,300 to 3,800 feet  
Annual precipitation: 24 to 30 inches  
Annual air temperature: 42 to 45 degrees F  
Frost-free period: 70 to 90 days

**Taxonomic Class:** Coarse-silty, mixed, active, frigid  
Vitrandic Eutrudepts

**Typical Pedon**

Tallcreek silt loam, 0 to 4 percent slopes, in an area of forestland, 700 feet south and 1,500 feet east of the northwest corner of sec. 4, T. 26 N., R. 27 W.

**O1**—1 inch to 0; undecomposed and slightly decomposed forest litter.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and many coarse roots; moderately acid; gradual wavy boundary.

Bw—4 to 18 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; slightly alkaline; gradual wavy boundary.

Bk—18 to 28 inches; olive gray (5Y 5/2) silt loam, light gray (5Y 7/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine masses of lime; slightly effervescent; slightly alkaline; abrupt wavy boundary.

C1—28 to 34 inches; light olive gray (5Y 6/2) silty clay loam varved lacustrine material, white (5Y 8/2) dry; moderate medium platy structure; slightly hard, friable, moderately sticky, moderately plastic; few medium and coarse roots; slightly effervescent; slightly alkaline; gradual wavy boundary.

C2—34 to 42 inches; light olive gray (5Y 6/2) silty clay loam varved lacustrine material, white (5Y 8/2) dry; massive; slightly hard, friable, moderately sticky, moderately plastic; slightly effervescent; slightly alkaline; gradual wavy boundary.

C3—42 to 60 inches; light olive gray (5Y 6/2) very fine sandy loam varved lacustrine material, white (5Y 8/2) dry; massive; slightly hard, very friable, nonsticky, nonplastic; slightly effervescent; slightly alkaline.

**Range in Characteristics**

Soil temperature: 44 to 47 degrees F  
Moisture control section: Between 4 and 12 inches  
Depth to the seasonal high water table: 48 to 72 inches

**A horizon**

Value: 5 or 6 dry; 3 or 4 moist  
Chroma: 1 or 2  
Clay content: 10 to 25 percent  
Moist bulk density: 1.0 to 1.30 g/cm³  
Acid oxalate extractable Al + 1/2 Fe: 0.3 to 1.0 percent  
Volcanic glass component: 20 to 45 percent  
Reaction: pH 5.6 to 7.3

**Bw horizon**

Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 5 to 18 percent
Acid oxalate extractable Al + 1/2 Fe: 0.3 to 1.0 percent
Volcanic glass component: 20 to 45 percent
Reaction: pH 6.1 to 7.8

Bk horizon
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 1 or 2
Clay content: 5 to 18 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

C horizons
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 1 or 2
Texture: Very fine sandy loam, silt loam, or silty clay loam varved lacustrine material
Clay content: 5 to 32 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

75B—Tallcreek silt loam, 0 to 4 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Tallcreek and similar soils: 90 percent

Minor Components
Blackcreek silt loam: 0 to 7 percent
Slopes greater than 4 percent: 0 to 3 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Water table: Apparent
Available water capacity: Mainly 10.5 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.

Tamarack Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Stream terraces and outwash plains
Parent material: Volcanic ash over alluvium or outwash
Slope range: 0 to 60 percent
Elevation range: 2,200 to 3,800 feet
Annual precipitation: 24 to 34 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 70 to 90 days

Typical Pedon

Tamarack loam, 2 to 8 percent slopes, in an area of forestland, 700 feet north and 1,300 feet east of the southwest corner of sec. 11, T. 26 N., R. 27 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
E—0 to 3 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine and few medium and coarse roots; moderately acid; clear wavy boundary.
Bw—3 to 12 inches; dark yellowish brown (10YR 4/4) fine sandy loam, very pale brown (10YR 7/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine and few medium and coarse roots; slightly acid; clear wavy boundary.
2E and Bt1—12 to 30 inches; E part (85 percent) is brown (10YR 5/3) loamy sand, very pale brown (10YR 7/3) dry; B part (15 percent) is dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry, broken discontinuous lamellae 1/16- to 1/4-inch thick; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; moderately acid; gradual wavy boundary.
2E and Bt2—30 to 44 inches; E part (80 percent) is brown (10YR 5/3) loamy coarse sand, very pale
brown (10YR 7/3) dry; B part (20 percent) is dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry, broken discontinuous lamellae 1/4- to 1/2-inch thick; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse roots; moderately acid; clear wavy boundary.

2C—44 to 60 inches; brown (10YR 5/3) loamy coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky, nonplastic; slightly acid.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Moisture control section: Between 8 and 24 inches

E horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Texture: Loam or fine sandy loam
Clay content: 8 to 20 percent
Moist bulk density: 1.00 to 1.30 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Reaction: pH 5.6 to 7.3

Bw horizon
Hue: 10YR or 7.5YR
Value: 6 or 7 dry; 4 or 5 moist
Clay content: 8 to 20 percent
Moist bulk density: 1.00 to 1.30 g/cm³
Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
Reaction: pH 5.6 to 7.3

2E and Bt horizons
Hue: 10YR or 7.5YR
Value: E part: 6 or 7 dry, 4 or 5 moist; Bt part: 5 or 6 dry, 4 or 5 moist
Clay content: E part: 2 to 8 percent; B part: 5 to 10 percent
Reaction: pH 5.6 to 7.3

2C horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 0 to 8 percent
Reaction: pH 5.6 to 7.3

69C—Tamarack loam, 2 to 8 percent slopes

Setting

Landform: Stream terraces and outwash plains
Position on landform: Treads

Slope: 2 to 8 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Tamarack and similar soils: 90 percent

Minor Components
Glaciercreek, cool: 0 to 5 percent
Slopes greater than 8 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: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
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.

691B—Tamarack-Crystallex complex, 0 to 4 percent slopes

Setting

Landform:
• Tamarack—Stream terraces and outwash plains
• Crystallex—Stream terraces and outwash plains

Position on landform:
• Tamarack—Treads
• Crystallex—Treads

Slope:
• Tamarack—0 to 4 percent
• Crystallex—0 to 4 percent

Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Tamarack and similar soils: 50 percent
Crystallex and similar soils: 40 percent
Minor Components
Slopes greater than 4 percent: 0 to 5 percent
Glaciercreek, cool: 0 to 5 percent

Major Component Description
Tamarack
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.9 inches

Crystalex
Surface layer texture: Loamy coarse sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
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.

691D—Tamarack-Crystalex complex, 4 to 15 percent slopes

Setting
Landform:
• Tamarack—Stream terraces and outwash plains
• Crystalex—Stream terraces and outwash plains
Position on landform:
• Tamarack—Treads
• Crystalex—Treads
Slope:
• Tamarack—4 to 15 percent
• Crystalex—4 to 15 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Tamarack and similar soils: 50 percent
Crystalex and similar soils: 40 percent

Minor Components
Glaciercreek, cool: 0 to 4 percent
Slopes greater than 15 percent: 0 to 3 percent
Half moon silt loam, cool: 0 to 3 percent

Major Component Description
Tamarack
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.9 inches

Crystalex
Surface layer texture: Loamy coarse sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
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.

691E—Tamarack-Crystalex complex, 15 to 30 percent slopes

Setting
Landform:
• Tamarack—Stream terraces and outwash plains
• Crystalex—Stream terraces and outwash plains
Position on landform:
• Tamarack—Dissected or incised treads
• Crystalex—Dissected or incised treads
Composition

Major Components
Tamarack and similar soils: 50 percent
Crystalex and similar soils: 40 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Glaciercreek, cool: 0 to 5 percent

Major Component Description

Tamarack
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.9 inches

Crystalex
Surface layer texture: Loamy coarse sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.6 inches

Management

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

Setting

Landform:
• Tamarack—Stream terraces and outwash plains
• Crystalex—Stream terraces and outwash plains
Position on landform:
• Tamarack—Risers
• Crystalex—Risers

Slope:
• Tamarack—30 to 60 percent
• Crystalex—30 to 60 percent
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 24 to 30 inches
Frost-free period: 70 to 90 days

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

Management

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

Setting

Landform: Stream terraces
Position on landform: Treads
Slope: 0 to 4 percent
Elevation: 2,200 to 3,800 feet
Mean annual precipitation: 24 to 34 inches
Frost-free period: 70 to 90 days
Composition

Major Components
Tamarack and similar soils: 90 percent

Minor Components
Dewberry silt loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 3 percent
Larchpoint silt loam: 0 to 2 percent

Major Component Description
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over alluvium or outwash
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

Tevis Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Colluvium
Slope range: 15 to 70 percent
Elevation: 3,700 to 5,500 feet
Annual precipitation: 23 to 34 inches
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 forestland, 1,400 feet south and 1,200 feet east of the northwest corner of sec. 7, T. 18 N., R. 23 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
A—0 to 8 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, medium, and coarse roots; 25 percent pebbles; slightly acid; clear smooth boundary.
E/Bw—8 to 21 inches; E part (80 percent) is light gray (10YR 7/2) extremely gravelly loam, grayish brown (10YR 5/2) moist; B part (20 percent) is pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles and 60 percent pebbles; neutral; clear smooth boundary.
C—21 to 60 inches; light gray (10YR 7/2) extremely gravelly loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 60 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 40 to 46 degrees F
Moisture control section: Between 8 and 24 inches
Note: Some pedons have an E horizon in place of the A horizon.

A horizon
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 10 to 15 percent
Content of rock fragments: 15 to 35 percent pebbles
Reaction: pH 5.6 to 7.3

E/Bw horizon
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Texture: 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 5.6 to 7.3

C horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or sandy 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
30E—Tevis gravelly loam,  
15 to 35 percent slopes

Setting
Landform: Mountains  
Slope: 15 to 35 percent  
Elevation: 3,700 to 5,500 feet  
Mean annual precipitation: 28 to 34 inches  
Frost-free period: 70 to 90 days

Composition
Major Components
Tevis and similar soils: 85 percent

Minor Components
Holloway gravelly silt loam: 0 to 5 percent  
Winkler gravelly loam, cool: 0 to 5 percent  
Slopes greater 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: Somewhat excessively drained  
Dominant parent material: Colluvium  
Native plant cover type: Forestland  
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.

30F—Tevis gravelly loam,  
35 to 60 percent slopes

Setting
Landform: Mountains  
Slope: 35 to 60 percent  
Elevation: 3,700 to 5,500 feet  
Mean annual precipitation: 28 to 32 inches  
Frost-free period: 70 to 90 days

Composition
Major Components
Tevis and similar soils: 60 percent  
Rubble land: 30 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent  
Winkler gravelly loam, cool: 0 to 3 percent  
Mitten gravelly silt loam: 0 to 2 percent

Major Component Description
Tevis  
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 2.9 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.

30G—Tevis-Rubble land complex,  
40 to 70 percent slopes

Setting
Landform: Mountains  
Slope: 40 to 70 percent  
Elevation: 3,700 to 5,500 feet  
Mean annual precipitation: 28 to 32 inches  
Frost-free period: 70 to 90 days

Composition
Major Components
Tevis and similar soils: 60 percent  
Rubble land: 30 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent  
Winkler gravelly loam, cool: 0 to 3 percent  
Mitten gravelly silt loam: 0 to 2 percent

Rubble land  
Definition: Areas covered by boulders or stones that support 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.

### 31E—Tevis gravelly loam, dry, 15 to 35 percent slopes

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 23 to 27 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**  
Tevis and similar soils: 90 percent

**Minor Components**  
Mitten gravelly silt loam: 0 to 5 percent  
Slopes greater 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:* Somewhat excessively drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 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.

### 441F—Tevis-Rock outcrop complex, 30 to 60 percent slopes

**Setting**

*Landform:* Mountains  
*Slope:* 30 to 60 percent  
*Elevation:* 3,600 to 5,000 feet  
*Mean annual precipitation:* 24 to 30 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**  
Tevis and similar soils: 50 percent  
Rock outcrop: 40 percent

**Minor Components**  
Mitten gravelly silt loam: 0 to 5 percent  
Slopes greater than 60 percent: 0 to 5 percent

**Major Component Description**

*Tevis*  
*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

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

For management information about this map unit, see appropriate sections in Part II of this publication.
Flooding: None
Available water capacity: Mainly 2.8 inches

Rock outcrop
Definition: Exposures of argillite and quartzite.

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

Management

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

Totelake Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid to the 2C horizon; rapid in the 2C horizon
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 15 percent
Elevation: 2,500 to 3,500 feet
Annual precipitation: 17 to 19 inches
Annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Haplustepts

Typical Pedon

Totelake gravelly loam, 2 to 8 percent slopes, in an area of forestland, 2,000 feet south and 650 feet west of the northeast corner of sec. 10, T. 18 N., R. 24 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
A—0 to 4 inches; gray (10YR 5/1) gravelly loam, very dark gray (10YR 3/1) moist; weak coarse granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent cobbles and 30 percent pebbles; neutral; clear wavy boundary.
Bw—4 to 21 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 40 percent pebbles; neutral; gradual wavy boundary.
2C—21 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few coarse roots; 25 percent cobbles and 50 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 12 and 35 inches

A horizon
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1, 2, or 3
Clay content: 8 to 15 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, 3, or 4
Clay content: 5 to 10 percent
Content of rock fragments: 35 to 60 percent—0 to 15 percent stones and cobbles; 35 to 45 percent pebbles
Reaction: pH 6.6 to 7.8

2C horizon
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Loamy sand or sand
Clay content: 0 to 10 percent
Content of rock fragments: 60 to 80 percent—15 to 25 percent stones and cobbles; 45 to 55 pebbles
Reaction: pH 6.6 to 7.8

21B—Totelake gravelly loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 17 to 19 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Totelake and similar soils: 90 percent

Minor Components
Slopes greater than 8 percent: 0 to 5 percent
Bigarm gravelly loam, alluvial: 0 to 4 percent
Areas of riverwash: 0 to 1 percent
Major Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
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.

Upsata Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid to 17 inches; very rapid below this depth
Landform: Stream terraces and outwash plains
Parent material: Volcanic ash over alluvium and glacial outwash
Slope range: 2 to 60 percent
Elevation range: 3,300 to 3,800 feet
Annual precipitation: 24 to 30 inches
Annual air temperature: 36 to 40 degrees F
Frost-free period: 40 to 60 days

Taxonomic Class: Sandy-skeletal, mixed Andic Eutricryepts

Typical Pedon

Upsata gravelly silt loam, 2 to 8 percent slopes, in an area of forestland, 900 feet south and 300 feet east of the northwest corner of sec. 13, T. 26 N., R. 27 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
E—0 to 2 inches; pinkish gray (7.5YR 6/2) gravelly silt loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; 20 percent pebbles; slightly acid; clear wavy boundary.
Bw—2 to 13 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common fine, medium, and coarse roots; 20 percent pebbles; moderately acid; clear wavy boundary.
2BC—13 to 17 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (7.5YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common medium and coarse roots; 5 percent cobbles and 25 percent pebbles; moderately acid; clear wavy boundary.
2C1—17 to 35 inches; pinkish gray (7.5YR 7/2) extremely gravelly loamy coarse sand, brown (7.5YR 5/2) moist; massive; loose, nonsticky, nonplastic; common medium roots; 10 percent cobbles and 60 percent pebbles; moderately acid; gradual wavy boundary.
2C2—35 to 60 inches; pinkish gray (7.5YR 7/2) extremely gravelly sand, brown (7.5YR 5/2) moist; massive; loose, nonsticky, nonplastic; few
medium roots; 25 percent cobbles and 50 percent pebbles; moderately acid.

**Range in Characteristics**

*Soil temperature:* 38 to 42 degrees F  
*Moisture control section:* Between 12 and 35 inches

**E horizon**
- **Value:** 6 or 7 dry; 3, 4, or 5 moist  
- **Clay content:** 7 to 15 percent  
- **Content of rock fragments:** 0 to 15 percent pebbles  
- **Moist bulk density:** 1.0 g/cm³ or less  
- **Acid oxalate extractable Al + 1/2 Fe:** More than 1 percent  
- **Reaction:** pH 5.1 to 6.5

**Bw horizon**
- **Hue:** 10YR or 7.5YR  
- **Value:** 5, 6, or 7 dry; 4 or 5 moist  
- **Chroma:** 4, 5, or 6  
- **Clay content:** 3 to 7 percent  
- **Content of rock fragments:** 15 to 35 percent—0 to 5 percent cobbles; 15 to 35 percent pebbles  
- **Moist bulk density:** 1.0 g/cm³ or less  
- **Acid oxalate extractable Al + 1/2 Fe:** More than 1 percent  
- **Reaction:** pH 5.6 to 6.5

**2BC horizon**
- **Hue:** 2.5YR, 5YR, or 7.5YR  
- **Value:** 5, 6, or 7 dry; 4 or 5 moist  
- **Chroma:** 2, 3, or 4  
- **Clay content:** 3 to 7 percent  
- **Content of rock fragments:** 15 to 35 percent—0 to 5 percent cobbles; 15 to 35 percent pebbles  
- **Reaction:** pH 5.1 to 6.5

**2C horizons**
- **Hue:** 2.5YR, 5YR, or 7.5YR  
- **Value:** 5, 6, or 7 dry; 4 or 5 moist  
- **Chroma:** 2, 3, or 4  
- **Texture:** Loamy coarse sand, loamy sand, or sand  
- **Clay content:** 0 to 5 percent  
- **Content of rock fragments:** 80 to 85 percent—15 to 25 percent cobbles; 45 to 60 percent pebbles  
- **Reaction:** pH 5.1 to 6.5

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**68C—Upsata gravelly silt loam,  
2 to 8 percent slopes**

**Setting**

*Landform:* Stream terraces and outwash plains  
*Position on landform:* Treads  
*Slope:* 2 to 8 percent  
*Elevation:* 3,300 to 3,800 feet  
*Mean annual precipitation:* 24 to 30 inches  
*Frost-free period:* 40 to 60 days

**Composition**

**Major Components**
- Upsata and similar soils: 90 percent

**Minor Components**
- Slopes greater than 8 percent: 0 to 5 percent  
- Tamarack loam: 0 to 3 percent  
- Ashworth gravelly silt loam: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Volcanic ash over alluvium or outwash  
*Native plant cover type:* Forestland  
*Flooding:* None  
*Available water capacity:* Mainly 3.0 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.

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**68E—Upsata gravelly silt loam,  
8 to 30 percent slopes**

**Setting**

*Landform:* Stream terraces and outwash plains  
*Position on landform:* Dissected or incised treads  
*Slope:* 8 to 30 percent
Elevation: 3,300 to 3,800 feet  
Mean annual precipitation: 24 to 30 inches  
Frost-free period: 40 to 60 days  

**Composition**  

**Major Components**  
Upsata and similar soils: 90 percent  

**Minor Components**  
Slopes greater than 30 percent: 0 to 5 percent  
Tamarack loam: 0 to 3 percent  
Ashworth gravelly silt loam: 0 to 2 percent  

**Major Component Description**  
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Excessively drained  
Dominant parent material: Volcanic ash over alluvium or outwash  
Native plant cover type: Forestland  
Flooding: None  
Available water capacity: Mainly 3.0 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.  

**68F—Upsata gravelly silt loam, 30 to 60 percent slopes**  

**Setting**  
Landform: Stream terraces and outwash plains  
Position on landform: Risers  
Slope: 30 to 60 percent  
Elevation: 3,300 to 3,800 feet  
Mean annual precipitation: 24 to 30 inches  
Frost-free period: 40 to 60 days  

**Composition**  

**Major Components**  
Upsata and similar soils: 90 percent  

**Minor Components**  
Slopes greater than 60 percent: 0 to 5 percent  
Tamarack loam: 0 to 3 percent  
Felan gravelly silt loam: 0 to 2 percent  

**Major Component Description**  
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Excessively drained  
Dominant parent material: Volcanic ash over alluvium or outwash  
Flooding: None  
Available water capacity: Mainly 3.0 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.  

**Vincom Series**  
Depth class: Very deep  
Drainage class: Well drained  
Permeability: Slow  
Landform: Lake plains and terraces  
Parent material: Lacustrine deposits  
Slope range: 8 to 60 percent  
Elevation: 2,500 to 3,000 feet  
Annual precipitation: 12 to 14 inches  
Frost-free period: 105 to 125 days  

**Taxonomic Class:** Fine-silty, mixed, active, calcareous, frigid Typic Xerorthents  

**Typical Pedon**  
Vincom silt loam, in an area of Kerrdam-Dryfork-Vincom silt loams, 8 to 35 percent slopes, in an area of rangeland, 2,500 feet south and 1,650 feet east of the northwest corner of sec. 25, T. 23 N., R. 24 W.  
A—0 to 3 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic;
many fine and few medium roots; moderately alkaline; clear smooth boundary.

E/Bw—3 to 7 inches; E part (60 percent) is white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; B part (40 percent) is light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common fine roots; moderately alkaline; clear smooth boundary.

Bk—7 to 14 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common fine roots; common fine masses and seams of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

C1—14 to 19 inches; white (10YR 8/2) silty clay loam, light gray (10YR 7/2) moist; massive; weak varves 1/16- to 1/8-inch thick; hard, friable, slightly sticky, moderately plastic; few fine roots; slightly effervescent; strongly alkaline; gradual smooth boundary.

C2—19 to 60 inches; white (10YR 8/2) silty clay loam, light gray (10YR 7/2) moist; massive; distinct varves 1/16- to 1/8-inch thick; hard, friable, slightly sticky, moderately plastic; slightly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the varved lake sediments: 6 to 22 inches

A horizon
Value: 6 or 7 dry; 4 or 5 moist
Clay content: 15 to 27 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.9 to 8.4

E/Bw horizon
Value: E part: 7 or 8 dry, 5 or 6 moist; B part: 6 or 7 dry, 5 or 6 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.9 to 8.4

Bk horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent
Calcium carbonate equivalent: 2 to 8 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 8.5 to 9.6

C horizons
Value: 7 or 8 dry; 6 or 7 moist
Chroma: 2 or 3
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 1 to 5 percent
Electrical conductivity (mmhos/cm): 0 to 2
Sodium adsorption ratio: 4 to 13
Reaction: pH 8.5 to 9.6

19F—Vincom silt loam, 35 to 60 percent slopes

Setting

Landform: Lake plains or terraces
Position on landform: Dissected or incised treads
Slope: 35 to 60 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Vincom and similar soils: 85 percent

Minor Components
Irvine silty clay loam: 0 to 5 percent
Lonepine silt loam: 0 to 5 percent
Areas of lake sediment outcrop: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
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.
119E—Vincom-Lonepine silt loams, 15 to 35 percent slopes

Setting

Landform:
- Vincom—Lake plains or terraces
- Lonepine—Lake plains or terraces

Position on landform:
- Vincom—Dissected or incised treads
- Lonepine—Dissected or incised treads

Slope:
- Vincom—15 to 35 percent
- Lonepine—15 to 20 percent

Elevation: 2,500 to 3,000 feet

Mean annual precipitation: 12 to 14 inches

Frost-free period: 105 to 125 days

Composition

Major Components
Vincom and similar soils: 55 percent
Lonepine and similar soils: 30 percent

Minor Components
Irvine silty clay loam: 0 to 9 percent
Round Butte silty clay loam: 0 to 3 percent
Slopes greater than 35 percent: 0 to 3 percent

Major Component Description

Vincom
- Surface layer texture: Silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Lacustrine deposits
- Native plant cover type: Rangeland
- Flooding: None
- Available water capacity: Mainly 9.1 inches

Lonepine
- Surface layer texture: Silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Lacustrine deposits
- Native plant cover type: Rangeland
- Flooding: None
- Available water capacity: Mainly 10.8 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.

119F—Vincom-Lake sediment outcrop complex, 35 to 60 percent slopes

Setting

Landform: Lake plains or terraces

Position on landform: Dissected or incised treads

Slope: 35 to 60 percent

Elevation: 2,500 to 3,000 feet

Mean annual precipitation: 12 to 14 inches

Frost-free period: 105 to 125 days

Composition

Major Components
Vincom and similar soils: 50 percent
Areas of lake sediment outcrop: 40 percent

Minor Components
Lonepine silt loam: 0 to 5 percent
Irvine silty clay loam: 0 to 5 percent

Major Component Description

Vincom
- Surface layer texture: Silt loam
- Depth class: Very deep (more than 60 inches)
- Drainage class: Well drained
- Dominant parent material: Lacustrine deposits
- Native plant cover type: Rangeland
- Flooding: None
- Available water capacity: Mainly 9.1 inches

Lake sediment outcrop
- Definition: Areas of varved lacustrine deposits.

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

Management

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

Waldbillig Series

Depth class: Very deep
- Drainage class: Well drained
- Permeability: Moderate
- Landform: Moraines and mountains
- Parent material: Volcanic ash over till or drift
- Slope range: 4 to 50 percent
- Elevation: 3,800 to 7,000 feet
- Annual precipitation: 30 to 50 inches
Annual air temperature: 37 to 42 degrees F  
Frost-free period: 30 to 60 days  

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

**Typical Pedon**  
Waldbillig gravelly silt loam, 30 to 50 percent slopes, in an area of forestland, 800 feet north and 100 feet east of the southwest corner of sec. 14, T. 17 N., R. 22 W.  
Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.  
Bw—0 to 9 inches; light brown (7.5YR 6/4) gravelly silt loam, brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, medium, and coarse roots; 10 percent cobbles and 15 percent pebbles; slightly acid; gradual smooth boundary.  
2E—9 to 15 inches; light gray (10YR 7/2) very gravelly fine sandy loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine and medium roots; 10 percent cobbles and 35 percent pebbles; slightly acid; gradual wavy boundary.  
2E/Bw—15 to 60 inches; E part (70 percent) is pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; B part (30 percent) is grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine roots; 5 percent stones, 10 percent cobbles, and 30 percent pebbles; slightly acid.  

**Range in Characteristics**  
Soil temperature: 39 to 44 degrees F  
Moisture control section: Between 8 and 24 inches  
Thickness of the volcanic ash-influenced layer: 7 to 14 inches  

**Bw horizon**  
Hue: 7.5YR or 10YR  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 3 or 4  
Clay content: 5 to 15 percent  
Content of rock fragments: 15 to 35 percent—0 to 10 percent cobbles; 15 to 25 percent pebbles  
Moist Bulk Density: 0.95 g/cm³ or less  
Reaction: pH 5.6 to 6.5  

**2E horizon**  
Value: 6 or 7 dry; 5 or 6 moist  
Chroma: 2 or 3  
Texture: Fine sandy loam, sandy loam, or loam  
Clay content: 7 to 18 percent  
Content of rock fragments: 35 to 60 percent—5 to 10 percent boulders, stones, and cobbles; 30 to 50 percent pebbles  
Reaction: pH 5.6 to 6.5  

**2E/Bw horizon**  
Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 5 or 6 dry, 4 or 5 moist  
Chroma: 2, 3, or 4  
Texture: Fine sandy loam, sandy loam, or loam  
Clay content: 7 to 18 percent  
Content of rock fragments: 35 to 60 percent—5 to 20 percent boulders, stones, and cobbles; 30 to 40 percent pebbles  
Reaction: pH 5.6 to 7.3  

**43E—Waldbillig gravelly silt loam, 8 to 30 percent slopes**  

**Setting**  
Landform: Moraines  
Slope: 8 to 30 percent  
Elevation: 4,800 to 6,500 feet  
Mean annual precipitation: 35 to 45 inches  
Frost-free period: 40 to 60 days  

**Composition**  
Major Components  
Waldbillig and similar soils: 85 percent  
Minor Components  
Bata gravelly silt loam: 0 to 5 percent  
Holloway gravelly silt loam: 0 to 5 percent  
Slopes greater than 30 percent: 0 to 5 percent  

**Major Component Description**  
Surface layer texture: Gravelly silt loam  
Depth class: Very deep (more than 60 inches)  
Drainage class: Well drained  
Dominant parent material: Volcanic ash over till or drift  
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.
**44D—Waldbillig gravelly silt loam, cool, 4 to 15 percent slopes**

**Setting**
- **Landform:** Moraines
- **Slope:** 4 to 15 percent
- **Elevation:** 5,500 to 7,000 feet
- **Mean annual precipitation:** 40 to 50 inches
- **Frost-free period:** 30 to 50 days

**Composition**

**Major Components**
- Waldbillig and similar soils: 90 percent

**Minor Components**
- Phillcher gravelly silt loam: 0 to 5 percent
- Slopes greater than 15 percent: 0 to 5 percent

**Major Component Description**
- **Surface layer texture:** Gravelly silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Volcanic ash over till or drift
- **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.

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**143E—Waldbillig-Holloway gravelly silt loams, 8 to 30 percent slopes**

**Setting**
- **Landform:**
  - Waldbillig—Moraines
  - Holloway—Mountains
- **Slope:**
  - Waldbillig—8 to 30 percent
  - Holloway—8 to 30 percent
- **Elevation:** 4,800 to 6,500 feet
- **Mean annual precipitation:** 35 to 45 inches
- **Frost-free period:** 40 to 60 days

**Composition**

**Major Components**
- Waldbillig and similar soils: 45 percent
- Holloway and similar soils: 40 percent

**Minor Components**
- Slopes greater than 30 percent: 0 to 5 percent
- Bata gravelly silt loam: 0 to 5 percent
- Waldbillig, bouldery: 0 to 3 percent
- Areas of rock outcrop: 0 to 2 percent

**Major Component Description**
- **Waldbillig**
  - **Surface layer texture:** Gravelly silt loam
  - **Depth class:** Very deep (more than 60 inches)
  - **Drainage class:** Well drained
  - **Dominant parent material:** Volcanic ash over till or drift
  - **Native plant cover type:** Forestland
  - **Flooding:** None
  - **Available water capacity:** Mainly 5.9 inches

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**58F—Waldbillig gravelly silt loam, moist, 30 to 50 percent slopes**

**Setting**
- **Landform:** Mountains
- **Slope:** 30 to 50 percent
- **Elevation:** 3,800 to 5,800 feet
- **Mean annual precipitation:** 30 to 50 inches
- **Frost-free period:** 30 to 50 days

**Composition**

**Major Components**
- Waldbillig and similar soils: 90 percent

**Minor Components**
- Slopes greater than 50 percent: 0 to 5 percent
- Holloway gravelly silt loam: 0 to 4 percent
- Areas of rock outcrop: 0 to 1 percent

**Major Component Description**
- **Waldbillig**
  - **Surface layer texture:** Gravelly silt loam
  - **Depth class:** Very deep (more than 60 inches)
  - **Drainage class:** Well drained
  - **Dominant parent material:** Volcanic ash over till or drift
  - **Native plant cover type:** Forestland
  - **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.
Holloway
*Surface layer texture*: Gravelly silt loam
*Depth class*: Very deep (more than 60 inches)
*Drainage class*: Somewhat excessively drained
*Dominant parent material*: Volcanic ash over colluvium
*Native plant cover type*: Forestland
*Flooding*: None
*Available water capacity*: Mainly 3.3 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.

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144E—Waldbillig-Holloway gravelly silt loams, cool, 8 to 30 percent slopes

**Setting**

*Landform:*
- Waldbillig—Moraines
- Holloway—Mountains

*Slope:*
- Waldbillig—8 to 30 percent
- Holloway—8 to 30 percent

*Elevation*: 5,500 to 7,000 feet
*Mean annual precipitation*: 40 to 50 inches
*Frost-free period*: 30 to 50 days

**Composition**

**Major Components**
Waldbillig and similar soils: 50 percent
Holloway and similar soils: 35 percent

**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Waldbillig, cool, stony: 0 to 4 percent
Areas of rock outcrop: 0 to 4 percent
Waldbillig, cool, bouldery: 0 to 2 percent

**Major Component Description**

Waldbillig
*Surface layer texture*: Gravelly silt loam
*Depth class*: Very deep (more than 60 inches)
*Drainage class*: Well drained
*Dominant parent material*: Volcanic ash over till or drift
*Native plant cover type*: Forestland
*Flooding*: None
*Available water capacity*: Mainly 5.9 inches

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582E—Waldbillig-Holloway gravelly silt loams, moist, 15 to 30 percent slopes

**Setting**

*Landform:*
- Waldbillig—Mountains
- Holloway—Mountains

*Slope:*
- Waldbillig—15 to 30 percent
- Holloway—15 to 30 percent

*Elevation*: 3,800 to 5,800 feet
*Mean annual precipitation*: 30 to 50 inches
*Frost-free period*: 30 to 50 days

**Composition**

**Major Components**
Waldbillig and similar soils: 50 percent
Holloway and similar soils: 40 percent

**Minor Components**
Slopes greater than 30 percent: 0 to 5 percent
Ashworth gravelly silt loam: 0 to 3 percent
Areas of rock outcrop: 0 to 2 percent

**Major Component Description**

Waldbillig
*Surface layer texture*: Gravelly silt loam
*Depth class*: Very deep (more than 60 inches)
*Drainage class*: Well drained
*Dominant parent material*: Volcanic ash over till or drift
*Native plant cover type*: Forestland
*Flooding*: None
*Available water capacity*: Mainly 6.0 inches
Holloway

*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Dominant parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*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.

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858E—Waldbillig gravelly silt loam, moist, 8 to 30 percent slopes

**Setting**

*Landform:* Moraines
*Slope:* 8 to 30 percent
*Elevation:* 3,800 to 5,800 feet
*Mean annual precipitation:* 30 to 50 inches
*Frost-free period:* 30 to 50 days

**Composition**

**Major Components**
Waldbillig and similar soils: 90 percent

**Minor Components**
Ashworth gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Gravelly silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Volcanic ash over till or drift
*Native plant cover type:* Forestland
*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.
W—Water

Composition

Major Components
Water: 100 percent

Major Component Description
Definition: Areas of open water

Whitearth Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow to 32 inches; moderately slow below this depth
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation: 2,500 to 3,000 feet
Annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Typic Natrixeralfs

Typical Pedon
Whitearth silt loam, in an area of Whitearth-Slickspots complex, 2 to 8 percent slopes, in an area of rangeland, 2,400 feet south and 1,900 feet west of the northeast corner of sec. 27, T. 23 N., R. 24 W.

E—0 to 7 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, nonplastic; common fine and few medium roots; moderately alkaline; gradual smooth boundary.

Btn—7 to 13 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate medium angular blocky structure; hard, firm, moderately sticky, slightly plastic; few fine roots; common faint clay films on faces of peds; very strongly alkaline; clear smooth boundary.

Bkn—13 to 32 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; disseminated lime; few fine masses of lime; strongly effervescent; very strongly alkaline; gradual smooth boundary.

C—32 to 60 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; massive; soft, friable, slightly sticky, nonplastic; disseminated lime; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches

E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Electrical conductivity (mmhos/cm): 1 to 2
Sodium adsorption ratio: 5 to 13
Reaction: pH 7.9 to 8.4

Btn horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Electrical conductivity (mmhos/cm): 4 to 8
Sodium adsorption ratio: 40 to 60
Reaction: pH 8.5 to 9.6

Bkn horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 3 or 4
Clay content: 27 to 35 percent
Calcium carbonate equivalent: 10 to 15 percent
Electrical conductivity (mmhos/cm): 4 to 8
Sodium adsorption ratio: 40 to 60
Reaction: pH 8.5 to 9.6

C horizon
Value: 7 or 8 dry; 5 or 6 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Calcium carbonate equivalent: 5 to 10 percent
Electrical conductivity (mmhos/cm): 4 to 16
Sodium adsorption ratio: 60 to 75
Reaction: pH 8.5 to 9.6

5B—Whitearth silt loam, 0 to 4 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Whitearth and similar soils: 90 percent
Minor Components
Areas of slickspots: 0 to 6 percent
Sonyok silty clay loam: 0 to 2 percent
Slopes greater than 4 percent: 0 to 2 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.3 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.

105B—Whitearth-Slickspots complex, 2 to 8 percent slopes

Setting
Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 12 to 14 inches
Frost-free period: 105 to 125 days

Composition

Major Components
Whitearth and similar soils: 65 percent
Areas of slickspots: 25 percent

Minor Components
Marklepass silty clay loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 4 percent
Sonyok silty clay loam: 0 to 1 percent

Major Component Description
Whitearth
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.3 inches

Slickspots
Definition: Areas of loamy or clayey soil with excess exchangeable sodium and low productivity.

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

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

Whitepine Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Lake plains and terraces
Parent material: Glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation range: 2,300 to 2,800 feet
Annual precipitation: 24 to 28 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 100 to 115 days

Taxonomic Class: Fine, mixed, active, frigid Vitrandic Hapludalfs

Typical Pedon
Whitepine silt loam, 0 to 4 percent slopes, in an area of forestland, 1,700 feet north and 1,000 feet west of the southeast corner of sec. 5, T. 22 N., R. 30 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
A—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; slightly acid; abrupt wavy boundary.
E—1 to 8 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; neutral; gradual wavy boundary.
E/Bt—8 to 14 inches; E part (60 percent) is brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common medium and coarse roots; common distinct clay
films on faces of peds; slightly acid; clear wavy boundary.

Bt/E—14 to 28 inches; B part (80 percent) is brown (7.5YR 5/4) clay, light brown (7.5YR 6/4) dry; E part (20 percent) is brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; strong medium subangular blocky structure; very hard, firm, very sticky, very plastic; common medium and coarse roots; many distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

C—28 to 60 inches; brown (7.5YR 5/4) clay, light brown (7.5YR 6/4) dry; massive; 1/16- to 1/2-inch thick varves of stratified silt loam, silty clay loam and clay; hard, firm, very sticky, very plastic; few medium and coarse roots; moderately acid.

**Range in Characteristics**

- **Soil temperature:** 44 to 47 degrees F
- **Moisture control section:** Between 4 and 12 inches

**A horizon**
- Value: 5, 6, or 7 dry; 3, 4, or 5 moist
- Clay content: 10 to 15 percent
- Moist bulk density: 1.0 to 1.40 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
- Reaction: pH 5.6 to 7.3

**E horizon**
- Value: 6 or 7 dry; 5 or 6 moist
- Clay content: 10 to 15 percent
- Moist bulk density: 1.0 to 1.40 g/cm³
- Acid oxalate extractable Al + 1/2 Fe: 0.4 to 1.0 percent
- Reaction: pH 5.6 to 7.3

**E/Bt horizon**
- Value: E part: 6 or 7 dry, 5 or 6 moist; B part: 6 or 7 dry, 4 or 5 moist
- Clay content: E part: 15 to 25 percent; B part: 40 to 60 percent
- Reaction: pH 5.6 to 7.3

**Bt/E horizon**
- Hue: B part: 10YR, 7.5YR, or 5YR; E part: 10YR
- Value: B part: 5, 6, or 7 dry, 4, 5, or 6 moist;
  E part: 6 or 7 dry, 4 or 5 moist
- Clay content: B part: 40 to 60 percent; E part: 20 to 27 percent
- Reaction: pH 5.6 to 7.3

**C horizon**
- Hue: 10YR, 7.5YR, or 5YR
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Texture: Clay, silt loam, or silty clay loam
- Clay content: 18 to 60 percent
- Reaction: pH 5.6 to 7.3

**85B—Whitepine silt loam, 0 to 4 percent slopes**

***Setting***

- **Landform:** Lake plains or terraces
- **Position on landform:** Treads
- **Slope:** 0 to 4 percent
- **Elevation:** 2,300 to 2,800 feet
- **Mean annual precipitation:** 24 to 28 inches
- **Frost-free period:** 100 to 115 days

***Composition***

**Major Components**
Whitepine and similar soils: 85 percent

**Minor Components**
Lionwood loam: 0 to 5 percent
Scotmont fine sandy loam: 0 to 5 percent
Slopes greater than 4 percent: 0 to 4 percent
Iffgulch and similar soils: 0 to 1 percent

**Major Component Description**

- **Surface layer texture:** Silt loam
- **Depth class:** Very deep (more than 60 inches)
- **Drainage class:** Well drained
- **Dominant parent material:** Glaciolacustrine deposits
- **Native plant cover type:** Forestland
- **Flooding:** None
- **Available water capacity:** Mainly 9.5 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.

**85D—Whitepine silt loam, 4 to 15 percent slopes**

***Setting***

- **Landform:** Lake plains or terraces
- **Position on landform:** Treads
- **Slope:** 4 to 15 percent
- **Elevation:** 2,300 to 2,800 feet
- **Mean annual precipitation:** 24 to 28 inches
- **Frost-free period:** 100 to 115 days
Composition

Major Components
Whitepine and similar soils: 85 percent

Minor Components
Scotmont fine sandy loam: 0 to 9 percent
Slopes greater than 15 percent: 0 to 3 percent
Beaverdump gravelly loam: 0 to 3 percent

Major Component Description
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Glaciolacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 9.5 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.

Wildgen Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Moraines and mountains
Parent material: Alpine till and drift derived from argillite and quartzite
Slope range: 4 to 50 percent
Elevation: 3,000 to 5,200 feet
Annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

Typical Pedon
Wildgen gravelly loam, 30 to 50 percent slopes, in an area of forestland, 3,600 feet south and 2,400 feet east of the northwest corner of sec. 14, T. 17 N., R. 22 W.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.
A—0 to 7 inches; light grayish brown (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles and 20 percent pebbles; slightly acid; gradual smooth boundary.

E—7 to 22 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; soft, friable, nonsticky, slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent cobbles and 35 percent pebbles; neutral; gradual wavy boundary.

E/Bw—22 to 60 inches; E part (60 percent) is very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; B part (40 percent) is grayish brown (10YR 5/2) very gravelly loam, brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine roots; 15 percent cobbles and 40 percent pebbles; slightly acid.

Range in Characteristics
Soil temperature: 40 to 47 degrees F
Moisture control section: Between 4 and 12 inches

A horizon
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 1, 2, or 3
Clay content: 15 to 25 percent
Content of rock fragments: 20 to 35 percent—0 to 5 percent cobbles; 20 to 30 percent pebbles
Reaction: pH 6.1 to 7.3

E horizon
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 10 to 25 percent
Content of rock fragments: 35 to 60 percent—0 to 20 percent stones and cobbles; 35 to 40 percent pebbles
Reaction: pH 6.1 to 7.3

E/Bw horizon
Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist
Chroma: E part: 2 or 3; B part: 2, 3, or 4
Texture: Loam or sandy loam
Clay content: 10 to 25 percent
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
25D—Wildgen gravelly loam, 4 to 15 percent slopes

Setting
Landform: Moraines
Slope: 4 to 15 percent
Elevation: 3,000 to 5,200 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Wildgen and similar soils: 85 percent

Minor Components
Winkler gravelly loam: 0 to 5 percent
Combest gravelly silt loam: 0 to 5 percent
Slopes greater than 15 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: Alpine till or glacial drift
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.

25E—Wildgen gravelly loam, 15 to 30 percent slopes

Setting
Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,000 to 5,200 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Wildgen and similar soils: 85 percent

Minor Components
Slopes greater than 30 percent: 0 to 6 percent
Combest gravelly silt loam: 0 to 5 percent
Winkler gravelly loam: 0 to 4 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 or glacial drift
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.

25F—Wildgen gravelly loam, 30 to 50 percent slopes

Setting
Landform: Mountains
Slope: 30 to 50 percent
Elevation: 3,200 to 5,200 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Wildgen and similar soils: 85 percent

Minor Components
Combest gravelly silt loam: 0 to 5 percent
Rock outcrop: 0 to 5 percent
Slopes greater than 50 percent: 0 to 3 percent
Winkler gravelly loam: 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: Alpine till or glacial drift
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.

**27D—Wildgen gravelly loam, dry, 4 to 15 percent slopes**

**Setting**

*Landform:* Moraines  
*Slope:* 4 to 15 percent  
*Elevation:* 3,000 to 4,200 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Wildgen and similar soils: 85 percent

**Minor Components**

Winkler gravelly loam, cool: 0 to 5 percent  
Slopes greater than 15 percent: 0 to 5 percent  
Winfall gravelly loam: 0 to 3 percent  
Areas of rock outcrop: 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:* Alpine till or glacial drift  
*Native plant cover type:* Forestland  
*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.

**27E—Wildgen gravelly loam, dry, 15 to 30 percent slopes**

**Setting**

*Landform:* Moraines  
*Slope:* 15 to 30 percent  
*Elevation:* 3,200 to 4,800 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Wildgen and similar soils: 85 percent

**Minor Components**

Slopes greater than 30 percent: 0 to 5 percent  
Winkler gravelly loam, cool: 0 to 5 percent  
Winfall gravelly loam: 0 to 3 percent  
Areas of rock outcrop: 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:* Alpine till or glacial drift  
*Native plant cover type:* Forestland  
*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.

**27F—Wildgen gravelly loam, dry, 30 to 50 percent slopes**

**Setting**

*Landform:* Mountains  
*Slope:* 30 to 50 percent  
*Elevation:* 3,200 to 4,800 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 70 to 90 days

**Composition**

**Major Components**

Wildgen and similar soils: 85 percent

**Minor Components**

Winkler gravelly loam, cool: 0 to 5 percent  
Areas of rock outcrop: 0 to 5 percent  
Slopes greater than 50 percent: 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: Alpine till or glacial drift
Native plant cover type: Forestland
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.

Winfall Series
Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Moraines and mountains
Parent material: Alpine till and drift derived from argillite and quartzite
Slope range: 8 to 60 percent
Elevation: 3,900 to 5,500 feet
Annual precipitation: 24 to 34 inches
Annual air temperature: 38 to 44 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lamellic Eutrudepts

Typical Pedon
Winfall gravelly loam, 8 to 30 percent slopes, in an area of forestland, 2,000 feet north and 2,000 feet east of the southwest corner of sec. 18, T. 17 N., R. 21 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.
E—0 to 8 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 30 percent pebbles; slightly acid; clear smooth boundary.
E/Bw—8 to 60 inches; E part (60 percent) is light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; B part (40 percent) is yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent cobbles and 40 percent pebbles; slightly acid.

Range in Characteristics
Soil temperature: 42 to 46 degrees F
Moisture control section: Between 8 and 24 inches

E horizon
Value: 5, 6, or 7 dry; 4 or 5 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 6.5

E/Bw horizon
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 or sandy loam
Clay content: 10 to 20 percent
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

34E—Winfall gravelly loam, 8 to 30 percent slopes

Setting
Landform: Moraines
Slope: 8 to 30 percent
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Winfall and similar soils: 85 percent

Minor Components
Waldbillig gravelly silt loam: 0 to 5 percent
Courville gravelly silt loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 4 percent
Tevis gravelly loam: 0 to 1 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 or glacial drift
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.

34F—Winfall gravelly loam, 30 to 50 percent slopes

Setting

Landform: Mountains
Slope: 30 to 50 percent
Elevation: 4,000 to 5,500 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Winfall and similar soils: 85 percent

Minor Components
Courville gravelly silt loam: 0 to 5 percent
Tevis gravelly loam: 0 to 3 percent
Areas of rubble land: 0 to 3 percent
Areas of rock outcrop: 0 to 2 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 or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.5 inches

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

134E—Winfall-Courville complex, 8 to 30 percent slopes

Setting

Landform:
• Winfall—Moraines
• Courville—Moraines
Slope:
• Winfall—8 to 30 percent
• Courville—8 to 30 percent
Elevation: 4,200 to 5,500 feet
Mean annual precipitation: 26 to 34 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Winfall and similar soils: 50 percent
Courville and similar soils: 35 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 4 percent
Winfall gravelly loam, dry: 0 to 3 percent
Tevis gravelly loam: 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 or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.5 inches

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
Native plant cover type: Forestland
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.

138E—Winfall-Courville complex, dry, 8 to 30 percent slopes

Setting
Landform:
• Winfall—Moraines
• Courville—Moraines
Slope:
• Winfall—8 to 30 percent
• Courville—8 to 30 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 24 to 26 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Winfall and similar soils: 50 percent
Courville and similar soils: 35 percent

Minor Components
Slopes greater than 30 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 4 percent
Tevis gravelly loam, dry: 0 to 3 percent
Wildgen gravelly loam, dry: 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 or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.5 inches

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
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.

522F—Winfall-Courville complex, 30 to 60 percent slopes

Setting
Landform:
• Winfall—Mountains
• Courville—Mountains
Slope:
• Winfall—30 to 60 percent
• Courville—30 to 60 percent
Elevation: 3,900 to 5,500 feet
Mean annual precipitation: 28 to 34 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Winfall and similar soils: 55 percent
Courville and similar soils: 35 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent
Winfall gravelly loam, dry: 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 or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.5 inches

Courville
Surface layer texture: Gravelly silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Volcanic ash over till or drift
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.
**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 70 percent  
**Elevation:** 2,800 to 5,200 feet  
**Annual precipitation:** 18 to 22 inches  
**Annual air temperature:** 38 to 45 degrees F  
**Frost-free period:** 70 to 90 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

**Typical Pedon**

Winkler gravelly loam, 35 to 60 percent slopes, in an area of forestland, 800 feet north and 2,000 feet east of the southwest corner of sec. 32, T. 23 N., R. 24 W.

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

A—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and common coarse roots; 5 percent cobbles and 25 percent pebbles; neutral; clear smooth boundary.

E—4 to 22 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 10 percent cobbles and 60 percent pebbles; neutral; gradual wavy boundary.

E/Bw—22 to 60 inches; E part (80 percent) is light yellowish brown (10YR 6/4) extremely gravelly sandy loam, brown (10YR 4/3) moist; B part (20 percent) is yellowish brown (10YR 5/4) extremely gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky, nonplastic; few medium roots; 20 percent cobbles and 60 percent pebbles; slightly acid.

**Range in Characteristics**

**Soil temperature:** 42 to 47 degrees F  
**Moisture control section:** Between 8 and 24 inches  
**Note:** Some pedons have a C horizon below the E/Bw.

**A horizon**

Value: 5 or 6 dry; 3 or 4 moist  
Chroma: 2 or 3  
Texture: Sandy loam or loam  
Clay content: 5 to 15 percent  
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent pebbles  
Reaction: pH 6.1 to 7.3

**E horizon**

Value: 6 or 7 dry; 4 or 5 moist  
Chroma: 2, 3, or 4  
Texture: Sandy loam or loam  
Clay content: 5 to 15 percent  
Content of rock fragments: 35 to 70 percent—0 to 10 percent cobbles; 35 to 60 percent pebbles  
Reaction: pH 5.6 to 7.3

**E/Bw horizon**

Value: E part: 6 or 7 dry, 4 or 5 moist; B part: 5 or 6 dry, 4 or 5 moist  
Chroma: 2, 3, or 4  
Texture: Sandy loam or loam  
Clay content: 5 to 15 percent  
Content of rock fragments: 60 to 85 percent—10 to 25 percent cobbles; 50 to 60 percent pebbles  
Reaction: pH 5.6 to 6.5

**20E—Winkler gravelly loam, 15 to 35 percent slopes**

**Setting**

**Landform:** Mountains  
**Slope:** 15 to 35 percent  
**Elevation:** 3,200 to 4,800 feet  
**Mean annual precipitation:** 18 to 20 inches  
**Frost-free period:** 70 to 90 days

**Composition**

**Major Components**

Winkler and similar soils: 85 percent

**Minor Components**

Slopes greater than 35 percent: 0 to 5 percent  
Winkler gravelly loam, cool: 0 to 4 percent  
Wildgen gravelly loam: 0 to 3 percent  
Sharrott gravelly loam: 0 to 2 percent  
Areas of rock outcrop: 0 to 1 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.

20G—Winkler-Rubble land complex, 40 to 70 percent slopes

Setting

Landform: Mountains
Slope: 40 to 70 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Winkler and similar soils: 55 percent
Rubble land: 30 percent

Minor Components
Sharrott gravelly loam: 0 to 4 percent
Areas of rock outcrop: 0 to 4 percent
Winkler gravelly loam, cool: 0 to 4 percent
Slopes less than 40 percent: 0 to 3 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

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

Management

For management information about this map unit, see appropriate sections in Part II of this publication.
22E—Winkler gravelly sandy loam, cool, 15 to 35 percent slopes

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Winkler and similar soils: 85 percent

Minor Components
Winkler gravelly loam: 0 to 5 percent
Wildgen gravelly loam: 0 to 4 percent
Slopes greater than 35 percent: 0 to 3 percent
Sharrott gravelly loam, cool: 0 to 2 percent
Areas of rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Gravelly 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

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

Management

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

22F—Winkler gravelly sandy loam, cool, 35 to 60 percent slopes

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 19 to 21 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
Areas of rubble land: 0 to 4 percent
Winkler gravelly loam: 0 to 4 percent
Sharrott gravelly loam, cool: 0 to 2 percent

Major Component Description

Surface layer texture: Gravelly 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

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

Management

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

22G—Winkler, cool-Rubble land complex, 40 to 70 percent slopes

Setting

Landform: Mountains
Slope: 40 to 70 percent
Elevation: 3,500 to 5,200 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Winkler and similar soils: 60 percent
Rubble land: 25 percent

Minor Components
Areas of rock outcrop: 0 to 5 percent
Sharrott gravelly loam, cool: 0 to 5 percent
Winkler gravelly loam: 0 to 5 percent

Major Component Description

Winkler
Surface layer texture: Gravelly 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
Rubble land
Definition: Areas covered by stones or boulders that support 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.

120G—Winkler-Sharrott-Rubble land complex, 40 to 85 percent slopes

Setting
Landform:
- Winkler—Mountains
- Sharrott—Mountains
Slope:
- Winkler—40 to 70 percent
- Sharrott—40 to 85 percent
Elevation: 3,200 to 4,800 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Winkler and similar soils: 40 percent
Sharrott and similar soils: 30 percent
Rubble land: 15 percent

Minor Components
Slopes less than 40 percent: 0 to 5 percent
Areas of rock outcrop: 0 to 5 percent
Winkler gravelly loam, cool: 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

Sharrott
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium or residuum
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.2 inches

Rubble land
Definition: Areas covered by stones or boulders that support 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.

122E—Winkler, cool-Sharrott, cool-Rock outcrop complex, 8 to 40 percent slopes

Setting
Landform:
- Winkler—Mountains
- Sharrott—Mountains
Slope:
- Winkler—8 to 40 percent
- Sharrott—8 to 40 percent
Elevation: 3,500 to 4,000 feet
Mean annual precipitation: 19 to 21 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Winkler and similar soils: 40 percent
Sharrott and similar soils: 25 percent
Rock outcrop: 25 percent

Minor Components
Areas of rubble land: 0 to 4 percent
Slopes greater than 40 percent: 0 to 3 percent
Winkler gravelly loam: 0 to 3 percent

Major Component Description
Winkler
Surface layer texture: Gravelly 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

Sharrott
Surface layer texture: Gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained  
Dominant parent material: Colluvium or residuum  
Native plant cover type: Forestland  
Flooding: None  
Available water capacity: Mainly 1.1 inches

Rock outcrop  
Definition: Exposures of argillite and quartzite.

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

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

122G—Winkler, cool-Sharrott, cool- 
Rubble land complex, 40 to 85 percent slopes

Setting  
Landform:  
• Winkler—Mountains  
• Sharrott—Mountains  
Slope:  
• Winkler—40 to 70 percent  
• Sharrott—40 to 85 percent  
Elevation: 3,200 to 5,200 feet  
Mean annual precipitation: 19 to 21 inches  
Frost-free period: 70 to 90 days

Composition  
Major Components  
Winkler and similar soils: 55 percent  
Sharrott and similar soils: 20 percent  
Rubble land: 15 percent  

Minor Components  
Areas of rock outcrop: 0 to 4 percent  
Slopes less than 40 percent: 0 to 3 percent  
Winkler gravelly loam: 0 to 3 percent

Major Component Description  
Winkler  
Surface layer texture: Gravelly 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

Sharrott  
Surface layer texture: Gravelly loam  
Depth class: Shallow (10 to 20 inches)  
Drainage class: Well drained  
Dominant parent material: Colluvium or residuum  
Native plant cover type: Forestland  
Flooding: None  
Available water capacity: Mainly 1.1 inches

Rubble land  
Definition: Areas covered by boulders or stones that support 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.

532E—Winkler-Sharrott-Rock outcrop complex, 8 to 40 percent slopes

Setting  
Landform:  
• Winkler—Mountains  
• Sharrott—Mountains  
Slope:  
• Winkler—8 to 40 percent  
• Sharrott—8 to 40 percent  
Elevation: 2,800 to 4,200 feet  
Mean annual precipitation: 18 to 20 inches  
Frost-free period: 70 to 90 days

Composition  
Major Components  
Winkler and similar soils: 40 percent  
Sharrott and similar soils: 25 percent  
Rock outcrop: 20 percent  

Minor Components  
Areas of rubble land: 0 to 5 percent  
Slopes greater than 40 percent: 0 to 5 percent  
Winkler gravelly loam, cool: 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 3.5 inches
**Soil Survey**

**Flooding:** None  
**Available water capacity:** Mainly 3.2 inches

**Sharrott**  
*Surface layer texture:* Gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium or residuum  
*Native plant cover type:* Forestland  
**Flooding:** None  
**Available water capacity:** Mainly 1.2 inches

**Rock outcrop**  
*Definition:* Exposures of argillite and quartzite.

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

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

**Yellowbay Series**

*Depth class:* Very deep  
*Drainage class:* Excessively drained  
*Permeability:* Moderately rapid to 17 inches; rapid below this depth  
*Landform:* Stream terraces and escarpments  
*Parent material:* Alluvium  
*Slope range:* 2 to 30 percent  
*Elevation range:* 2,300 to 3,600 feet  
*Annual precipitation:* 15 to 24 inches  
*Annual air temperature:* 39 to 45 degrees F  
*Frost-free period:* 100 to 120 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Typic Haploxerepts

**Typical Pedon**

Yellowbay gravelly loam, 2 to 8 percent slopes, in an area of forestland, 2,500 feet south and 2,200 feet west of the northeast corner of sec. 31, T. 21 N., R. 27 W.

Oi—1 inch to 0; undecomposed and slightly decomposed forest litter.  
A—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly loam, dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 20 percent pebbles; moderately acid; abrupt smooth boundary.  
Bw—2 to 17 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine, fine, and medium roots; 40 percent pebbles; moderately acid; clear wavy boundary.  
BC—17 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; 5 percent cobbles and 70 percent pebbles; moderately acid.

**Range in Characteristics**  
**Soil temperature:** 42 to 46 degrees F  
**Moisture control section:** Between 12 and 35 inches

**A horizon**  
Value: 4 or 5 dry; 2 or 3 moist  
Chroma: 2 or 3  
Clay content: 7 to 15 percent  
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 35 percent pebbles  
Reaction: pH 5.6 to 7.3

**Bw horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 3 or 4  
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

**BC horizon**  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 3 or 4  
Clay content: 2 to 5 percent  
Content of rock fragments: 60 to 80 percent—0 to 10 percent cobbles; 60 to 70 percent pebbles  
Reaction: pH 5.6 to 7.3
54C—Yellowbay gravelly loam, 2 to 8 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 2 to 8 percent
Elevation: 2,400 to 3,600 feet
Mean annual precipitation: 18 to 20 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Yellowbay and similar soils: 90 percent
Minor Components
Beaverdump gravelly loam: 0 to 5 percent
Slopes greater than 8 percent: 0 to 5 percent

Major Component Description
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.4 inches

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

541C—Yellowbay gravelly loam, moist, 2 to 8 percent slopes

Setting
Landform: Stream terraces
Position on landform: Treads
Slope: 2 to 8 percent
Elevation: 2,300 to 2,600 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Yellowbay and similar soils: 90 percent

542F—Yellowbay-Selon-Bemishave complex, 15 to 60 percent slopes

Setting
Landform:
- Yellowbay—Escarpments
- Selon—Escarpments
- Bemishave—Escarpments
Position on landform:
- Yellowbay—Backslopes
- Selon—Backslopes, footslopes, and side slopes
- Bemishave—Foothslopes
Slope:
- Yellowbay—15 to 30 percent
- Selon—15 to 60 percent
- Bemishave—15 to 35 percent
Elevation: 2,400 to 2,700 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 100 to 120 days

Composition
Major Components
Yellowbay and similar soils: 40 percent
Selon and similar soils: 30 percent
Bemishave and similar soils: 15 percent

Minor Components
Slopes greater than 60 percent: 0 to 5 percent
Bigarm, alluvial: 0 to 7 percent
Major Component Description

Yellowbay
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.4 inches

Selon
Surface layer texture: Fine 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 8.1 inches

Bemishave
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Lacustrine deposits
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.4 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.

543F—Yellowbay-Selon-Sacheen complex, 15 to 60 percent slopes

Setting

Landform:
- Yellowbay—Escarpments
- Selon—Escarpments
- Sacheen—Escarpments

Slope:
- Yellowbay—15 to 30 percent
- Selon—15 to 60 percent
- Sacheen—15 to 60 percent

Elevation: 2,400 to 2,800 feet
Mean annual precipitation: 16 to 20 inches
Frost-free period: 100 to 115 days

Composition

Major Components
Yellowbay and similar soils: 40 percent
Selon and similar soils: 30 percent
Sacheen and similar soils: 20 percent

Minor Components
Slopes greater than 60 percent: 0 to 4 percent
Bemishave loam: 0 to 3 percent
Winkler gravelly loam, cool: 0 to 3 percent

Major Component Description

Yellowbay
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.4 inches

Selon
Surface layer texture: Fine 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 8.1 inches

Sacheen
Surface layer texture: Loamy fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Eolian deposits
Native plant cover type: Forestland
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.

**Yourame Series**

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Moraines, mountain slopes, stream terraces, and alluvial fans  
*Parent material:* Glacial till and drift derived from argillite and quartzite  
*Slope range:* 0 to 50 percent  
*Elevation:* 3,000 to 5,000 feet  
*Annual precipitation:* 17 to 22 inches  
*Annual air temperature:* 38 to 44 degrees F  
*Frost-free period:* 70 to 90 days  

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

**Typical Pedon**

Yourame gravelly loam, 4 to 15 percent slopes, in an area of forestland, 500 feet north and 2,200 feet east of the southwest corner of sec. 4, T. 21 N., R. 29 W.

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

E1—0 to 5 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent cobbles and 25 percent pebbles; neutral; clear wavy boundary.

E2—5 to 11 inches; very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent cobbles and 25 percent pebbles; neutral; clear wavy boundary.

E/Bt—11 to 17 inches; E part (70 percent) is very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) moist; B part (30 percent) is very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium and few coarse roots; many distinct clay films on faces of peds; 5 percent cobbles and 25 percent pebbles; neutral; clear wavy boundary.

Bt—17 to 34 inches; very pale brown (10YR 7/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine, fine, medium, and coarse roots; many distinct clay films on faces of peds; 10 percent cobbles and 40 percent pebbles; neutral; gradual wavy boundary.

Bk—34 to 60 inches; very pale brown (10YR 8/3) very gravelly clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; hard, very friable, moderately sticky, moderately plastic; few very fine, fine, medium, and coarse roots; 15 percent cobbles and 40 percent pebbles; few fine masses of lime; strongly effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 42 to 46 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bk horizon:* 30 to 60 inches

**E horizons**

*Value:* E part: 6 or 7 dry, 4 or 5 moist; B part: 5, 6, or 7 dry, 4 or 5 moist  
*Chroma:* 2 or 3  
*Clay content:* 7 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

**E/Bt horizon**

*Value:* E part: 6 or 7 dry, 4 or 5 moist; B part: 5, 6, or 7 dry, 4 or 5 moist  
*Chroma:* 2, 3, or 4  
*Clay content:* 7 to 15 percent  
*Content of rock fragments:* 15 to 35 percent—0 to 10 percent cobbles; 15 to 30 percent pebbles  
*Reaction:* pH 5.6 to 7.3

**Bt horizon**

*Value:* 5, 6, or 7 dry; 4 or 5 moist  
*Chroma:* 2, 3, or 4  
*Texture:* Clay loam or loam  
*Clay content:* 20 to 35 percent  
*Content of rock fragments:* 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent pebbles  
*Reaction:* pH 5.6 to 7.3

**Bk horizon**

*Value:* 6, 7, or 8 dry; 5, 6, or 7 moist  
*Chroma:* 2 or 3  
*Texture:* Clay loam or loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 60 percent—5 to 20 percent cobbles; 30 to 40 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

23D—Yourame gravelly loam,
4 to 15 percent slopes

Setting
Landform: Moraines
Slope: 4 to 15 percent
Elevation: 3,000 to 4,500 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Yourame and similar soils: 85 percent
Minor Components
Bignell gravelly loam: 0 to 5 percent
Slopes greater than 15 percent: 0 to 5 percent
Yourame gravelly loam, dry: 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 or glacial drift
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.

23E—Yourame gravelly loam,
15 to 30 percent slopes

Setting
Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,000 to 4,800 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Yourame and similar soils: 85 percent
Minor Components
Areas of rock outcrop: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent
Yourame gravelly loam, dry: 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 or glacial drift
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.
A typical soil description with range in characteristics is included, in alphabetical order, in this section.

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

29E—Yourame gravelly loam, dry, 15 to 30 percent slopes

Setting
Landform: Moraines
Slope: 15 to 30 percent
Elevation: 3,000 to 4,500 feet
Mean annual precipitation: 17 to 21 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Yourame and similar soils: 85 percent

Minor Components
Eaglewing gravelly loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent
Yourame gravelly loam: 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 or glacial drift
Native plant cover type: Forestland
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.

55B—Yourame gravelly loam, 0 to 4 percent slopes

Setting
Landform: Terraces and alluvial fans
Slope: 0 to 4 percent
Elevation: 3,000 to 3,500 feet
Mean annual precipitation: 20 to 22 inches
Frost-free period: 70 to 90 days

Composition
Major Components
Yourame and similar soils: 90 percent

Minor Components
Slopes greater than 4 percent: 0 to 5 percent
Rumblecreek gravelly loam: 0 to 3 percent
Bignell gravelly loam: 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: Alpine till or glacial drift
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.

123D—Yourame-Wildgen gravelly loams, 8 to 30 percent slopes

Setting
Landform:
• Yourame—Moraines
• Wildgen—Moraines
Slope:
• Yourame—8 to 30 percent
• Wildgen—8 to 30 percent
Elevation: 3,000 to 4,500 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 70 to 90 days

Composition

Major Components
Yourame and similar soils: 45 percent
Wildgen and similar soils: 40 percent

Minor Components
Winkler gravelly loam: 0 to 5 percent
Slopes greater than 30 percent: 0 to 5 percent
Yourame gravelly loam, dry: 0 to 5 percent

Major Component Description
Yourame
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till or glacial drift
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.8 inches

Wildgen
Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alpine till or glacial drift
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.
References


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:

<table>
<thead>
<tr>
<th>Category</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>0 to 3.75</td>
</tr>
<tr>
<td>Low</td>
<td>3.75 to 5.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>5.0 to 7.5</td>
</tr>
<tr>
<td>High</td>
<td>More than 7.5</td>
</tr>
</tbody>
</table>

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular
to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding planes.** Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-floored plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Bouldery.** Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

**Bouldery soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management.** Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

**Channery soil material.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.
Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to
compression. Terms describing consistence are defined in the “Soil Survey Manual” (Soil Survey Division Staff, 1993).

**Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

**Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

**Contour stripcropping (or contour farming).** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave (in tables).** The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Depth to rock (in tables).** Bedrock is too near the surface for the specified use.

**Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

**Drainage class (natural).** Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized: *Excessively drained.*—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated. *Somewhat excessively drained.*—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.
Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields. Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these. Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these. Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these. Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep. Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.
Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

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 sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of 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.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.
Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciolfluvial 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, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.
Also, a plowed surface horizon, most of which was originally part of a B horizon.

**E horizon.**—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

**B horizon.**—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or brownier 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, soils are 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.

**Increasers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

<table>
<thead>
<tr>
<th>Rate Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>Less than 0.2</td>
</tr>
<tr>
<td>Low</td>
<td>0.2 to 0.4</td>
</tr>
<tr>
<td>Moderately low</td>
<td>0.4 to 0.75</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.75 to 1.25</td>
</tr>
<tr>
<td>Moderately high</td>
<td>1.25 to 1.75</td>
</tr>
<tr>
<td>High</td>
<td>1.75 to 2.5</td>
</tr>
<tr>
<td>Very high</td>
<td>More than 2.5</td>
</tr>
</tbody>
</table>

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.
Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

**Basin.**—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

**Border.**—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

**Controlled flooding.**—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

**Corrugation.**—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

**Drip (or trickle).**—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

**Furrow.**—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

**Sprinkler.**—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

**Subirrigation.**—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

**Wild flooding.**—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

**Kame terrace.** A terraclike 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.

**Molllic 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 aclimatized 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 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 codominant 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 codominant 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 codominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

- Nearly level ......................................... 0 to 2 percent
- Gently sloping ..................................... 2 to 4 percent
- Moderately sloping .............................. 4 to 8 percent
- Strongly sloping ............................... 8 to 15 percent
- Moderately steep ............................ 15 to 25 percent
- Steep ............................................... 25 to 45 percent
- Very steep ....................... more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

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 Na+ to Ca++ + Mg++. The degrees of sodicity and their respective ratios are:

- Slight .................................................. less than 13:1
- Moderate ............................................... 13-30:1
- Strong................................................ more than 30:1
Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth’s surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

<table>
<thead>
<tr>
<th>Size Range</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 0.25 mm</td>
<td>Medium sand</td>
</tr>
<tr>
<td>0.25 to 0.10 mm</td>
<td>Fine sand</td>
</tr>
<tr>
<td>0.10 to 0.05 mm</td>
<td>Very fine sand</td>
</tr>
<tr>
<td>0.05 to 0.002 mm</td>
<td>Silt</td>
</tr>
<tr>
<td>less than 0.002 mm</td>
<td>Clay</td>
</tr>
</tbody>
</table>

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.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.
**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an 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.
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