



United States  
Department of  
Agriculture

In cooperation with the  
Montana Agricultural  
Experiment Station

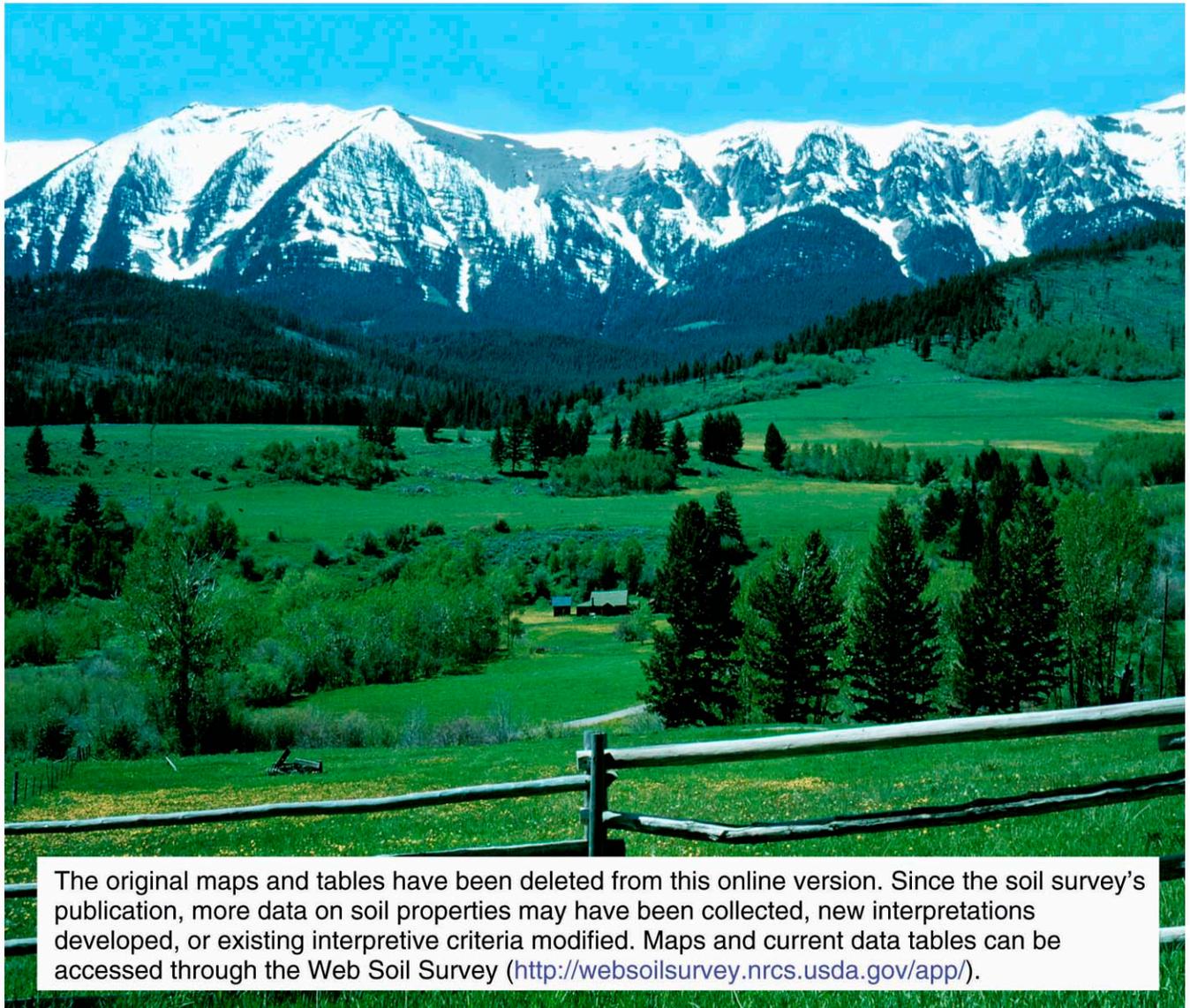
# MT622—Soil Survey of Gallatin County Area, Montana



Natural  
Resources  
Conservation  
Service



## Part I



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



# How to Use This Soil Survey

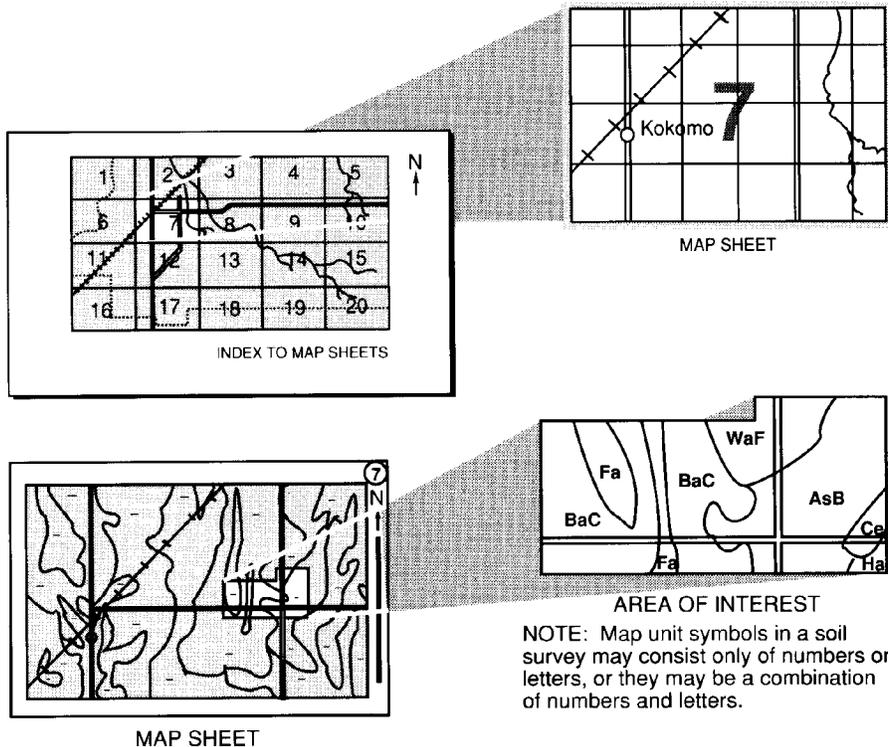
## Detailed Soil Maps

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

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

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

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



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

Major fieldwork for this soil survey was completed in 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 and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Gallatin County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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**Cover:** This view of the snow-covered Bridger Mountains contains both private and public lands. The foreground soils of Adel-Copenhaver complex and the drainageway soils of Bridger-Redlodge complex are on private land while the Yellowmule-Lonnibee, stony complex soils in the timber-covered foothills are on public land. The public land, including the Bridger Mountains, has been mapped in the "Soil Survey of Gallatin National Forest, Montana" (1996).

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

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# Foreword

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

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

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

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

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

Dave White  
State Conservationist  
Natural Resources Conservation Service

# Soil Survey of Gallatin County Area, Montana

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Fieldwork by Jay W. Brooker, Bradley J. Duncan, Thomas J. Keck, George A. Rolfes, and Z. Reed Simms, Natural Resources Conservation Service

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

## 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.

## General Nature of the Survey Area

Gallatin County Area is located in southwestern Montana (fig. 1). The survey area is located in Major Land Resource Areas 43 and 44 and consists of Gallatin County and a small portion of southeastern Broadwater County. Bozeman, the county seat, is located in the north-central part of the county. The survey area includes 879,100 acres or approximately 1,374 square miles. National forest areas within Gallatin County were not included in this survey.

The Gallatin County Area is part of the Missouri River drainage system. Most of Gallatin County drains directly into the Missouri River through the Gallatin, Madison, and Jefferson rivers. The area consists of about 14 major geologic formations.

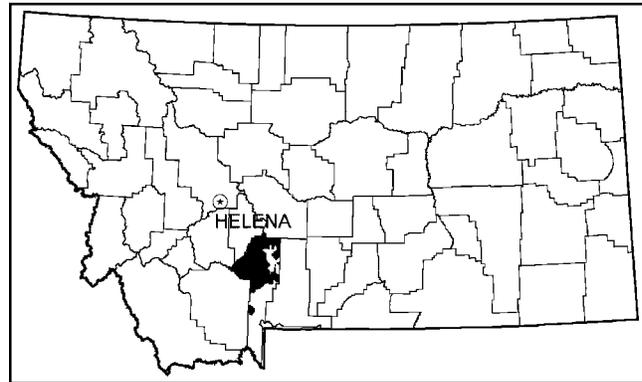


Figure 1.—Location of Gallatin County Area, Montana

This soil survey updates the “Soil Survey of the Gallatin Valley Area, Montana” (DeYoung and Smith, 1931). The present survey provides additional information and has larger maps, which show the soils in greater detail.

## History

Much of the material used in this section is courtesy of the Gallatin County Historical Society.

The native people who lived in the region referred to much of the area of modern-day Gallatin County as the “Valley of Flowers.” It was a productive hunting ground, and the tribes who shared its resources treated it as neutral communal territory. The county contained many species of wildlife and plants important to the existence and lifestyle of Native American tribes, such as the Bannock, Blackfeet, Crow, Flathead, Nez Perce, Shoshone, and Sioux.

In the late 18<sup>th</sup> century, European trappers in search of beaver and other fur resources were probably the first to arrive in what later would become Gallatin County.

The Lewis and Clark Expedition reached the headwaters of the Missouri River near the town of present-day Three Forks on July 21, 1805. They named the three rivers that form the Missouri River for presidents, Thomas Jefferson and James Madison, and for then-Secretary of the Treasury, Albert Gallatin. In 1810, explorers from the Missouri Fur Company established a trading post at the Missouri River headwaters. No lasting settlement occurred, and the post was abandoned after a short time. For the next several decades, trappers, fur traders, and other explorers continued to visit the area sporadically, until the discovery of gold in Alder Gulch near what is known today as Virginia City in Madison County.

In 1863, John Bozeman, an explorer and entrepreneur from Georgia, established a northern spur, soon known as the Bozeman Trail, off the Oregon Trail. During the three years that the Bozeman Trail was open, thousands of miners passed over it on their way to the gold fields. A section of the trail traveled west through the area that would later become Gallatin County.

In 1864, John Bozeman, W. J. Beall, and Daniel Rouse were responsible for developing a small trading settlement in Gallatin County. This settlement was a means of supplying the large influx of miners passing through the county on their way to the gold fields. This site was approximately 35 miles from the Missouri River headwaters toward the eastern side of the county, located in a fertile valley near the point where the Bozeman Trail left the mountains. After experiencing failure in the gold fields, many former gold-seekers returned to the productive lands of this valley to take up farming and ranching. In 1864, pioneer Nelson Story drove the first cattle herds to the area from Texas, and agriculture in the county continued to expand.

In February 1865, the first territorial legislature of Montana created Gallatin County. Gallatin City, a small settlement founded near the Missouri River headwaters, was initially declared the county seat.

In 1867, in accordance with the Treaty of Fort Laramie, the Bozeman Trail was closed, and the original trading settlement began to take on a more permanent character. During the same year, the population had grown sufficiently enough for the town to be declared the new county seat; it was named "Bozeman." Gallatin City, the old county seat, was later abandoned.

In 1867, Fort Ellis was established a few miles to the east of Bozeman in response to the conflicts with Native American tribes in the region over continuing settler infringement on native lands. The fort also served as a base for exploration of the area that would become Yellowstone National Park. Fort Ellis, along with its associated personnel, provided an additional market for local agricultural products, fostering further economic growth within the county.

The county's population growth remained relatively slow until 1883, the year it was linked to the rest of the country by the Northern Pacific Railway. Bozeman was incorporated as a city at this time, and the county began slow but steady population and economic growth. The major industries were farming, ranching, mining, and logging. Other major towns in the county, such as Belgrade, Manhattan, and Three Forks, were subsequently incorporated along the rail-line. Montana Agricultural College (later renamed

Montana State University) was founded as a land-grant institution in Bozeman. The first classes, held in the fall of 1893, had eight students in attendance. Such an event was indicative of the county's permanent transition to a stable and economically viable area.

## Industry and Transportation

According to the 2000 census, the current population of Gallatin County is 67,831 persons residing in a land area covering 1,620,787 acres. Out of those acres, 614,357 are federally owned, including U.S. Forest Service and Bureau of Land Management lands. Private lands in the county total 991,902 acres, with about one-third of those acres used for rangeland. Another 200,000 acres consist of irrigated and nonirrigated cropland with mainly small grains, alfalfa, and potatoes under cultivation. The remaining acres consist of forest land, hayland, and pasture as well as urban and built-up areas.

The economy of Gallatin County has historically been agriculturally based, with over 66-million dollars in combined receipts from crops and livestock in 1993. Extractive industries, such as logging and mining, continue to be significant as well. The county's economy has depended heavily on tourism since the early 1900s, when the railroad began promoting Yellowstone National Park as a tourist destination. Recreational opportunities, including angling, backpacking, backcountry skiing, downhill skiing, hiking, hunting, rafting, and snowmobiling, draw millions of tourist dollars into Gallatin County every year. Montana State University and its associated personnel, students, and activities, along with sectors of the state and federal government, also play a major role in the local economy. Development and population growth has occurred at a steady pace within the county in recent years. Although most of the employment areas, such as retail trade, manufacturing, and the service industry, have shown significant growth, farming and extractive industries have shown a slight decrease.

Two major highways currently serve the Gallatin County Area. U.S. Interstate 90 travels east and west through Gallatin County and connects the county with both coasts. Interstate 90 follows approximately the same route through the county as taken by the old Bozeman Trail. The main rail-line through the county also parallels this same route. U.S. Highway 191 runs south nearly to the Idaho border where it connects with U.S. Highways 287 and 20, which branch into Idaho, Yellowstone National Park, and north into Madison County. Numerous paved state highways

and secondary roads also serve the survey area. Gallatin Field, located 9 miles west of Bozeman, is a major airport for southwestern Montana, providing both major and commuter airline services.

## Physiography and Drainage

The soil survey area lies near the southern border of the Northern Rocky Mountain physiographic province and at the junction of four tectonic provinces. The Continental Divide forms the southern boundary of Gallatin County.

Gallatin County contains portions of five mountain ranges: the Bridger Range, which trends north-south across the northeastern portion of the county; the Gallatin Range, which runs north-south and forms the eastern boundary of the county; the Madison Range, which also trends north-south and forms the southwestern boundary of the county; the Horseshoe Hills, which trend northeast-southwest on the northern end of the county; and the southern end of the Big Belt Mountains, which run along the northern boundary of the survey area in southern Broadwater County.

A large, open intermountain valley, surrounded by rugged, mountainous terrain characterizes the county. The Gallatin, Madison, Yellowstone, and Missouri river systems drain the mountains. The Bridger Range has high relief, with extensive alluvial fans and minor glacial features. The Gallatin and Madison ranges also have high relief, with glacially sculpted valleys and narrow river canyons. The Horseshoe Hills have relatively low relief.

Roughly half of the county is included in the survey area, which extends from the West Fork of the West Gallatin River north to Three Forks and includes Spanish Creek Basin and the foothills along the western side of the Gallatin Range. To the north, the survey area takes in the western and eastern sides of the Bridger Range, the Gallatin and northern Madison valleys, the Horseshoe Hills, and the southern end of the Big Belt Mountains. Elevations in the survey area range from a low of 3,960 feet (1,207 m) above sea level near Clarkston to a high of approximately 8,760 feet (2,670 m) at the head of Beaver Creek in the southwestern part of the survey area. The peaks in the Bridger Mountains range from 8,900 feet (2,713 m) to 9,650 feet (2,941 m) above sea level. Mount Chisolm and Mount Bole in the Gallatin Range within Gallatin County each rise to an elevation of 10,333 feet (3,150 m). The highest peak in Gallatin County is Mount Wilson in the Spanish Peaks Wilderness Area with an elevation of 10,700 feet (3,261 m). Areas not

included in this soil survey consist mostly of high, mountainous terrain and the Hebgen Lake and West Yellowstone areas. Nearly all U.S. Forest Service lands, including portions of the Lee Metcalf Wilderness, and large parcels of private timber company lands were not included in this survey but are included in the published soil survey of Gallatin National Forest.

The Missouri River and its tributaries drain the soil survey area. The West Gallatin River drains the southern portion of the survey area, joining the East Gallatin River at Manhattan. The Madison and Jefferson rivers drain the western part of the survey area and converge with the Gallatin River north of the town of Three Forks to form the Missouri River. Bridger Creek drains the southern end of the Bridger Range and joins the East Gallatin River near Bozeman. The East Gallatin River drains the western side of the Bridger Range. The Shields River on the eastern side and Sixteenmile Creek to the north drain the Bridger Range. In the southern end of the survey area, the West Fork and Spanish Creek join the West Gallatin before flowing out into the broad Gallatin Valley.

## Geologic History and Regional Geology

The geologic record of Gallatin County began approximately 2.5 billion years ago in the early Precambrian, or Archean, Eon with the intense metamorphism of existing sedimentary and igneous rocks. This "basement complex" consists mainly of hard, coarse-grained amphibolite gneiss. These rocks are found in both the Gallatin and Madison ranges and in the southern end of the Bridger Range.

In late Precambrian time, during the Proterozoic Eon, a thick sequence of sedimentary rocks known as the Belt Supergroup were deposited in western Montana in basins bounded by normal faults. These sediments consist primarily of siltstone, sandstone, and some limestone. Locally, rocks from the LaHood Formation were deposited as blocks of Archean basement rock were uplifted and eroded.

Since late Precambrian time, rising and falling inland seas have inundated the survey area. During this time, varieties of sedimentary rocks were deposited in both marine and terrestrial environments. Rocks of the Belt Supergroup were subsequently buried and subjected to low-grade metamorphism. Nearly all of the geologic time scale is represented in Gallatin County except portions of the early Paleozoic Era.

The prominent structural features visible today began forming approximately 65 million years ago in

the Early Tertiary Period. Intense folding and faulting occurred as the result of crustal collisions to the west. Rocks of the Belt Supergroup were faulted and moved to the east where they are presently exposed in portions of northern Gallatin County. Continued structural activity uplifted and folded older rocks to form the ancestral Rocky Mountains. Regional extension during the mid-Eocene caused down dropping of the Three Forks Basin and the relative uplift of the Bridger Range. Erosion of these newly formed mountains produced sediment that was deposited in tectonic basins from late in the Tertiary Period to the present.

The Tertiary Period was also a time of intense volcanic activity associated with the Boulder Batholith to the west and the Absaroka-Gallatin Volcanic Field to the east. Volcanic sediments are found in much of the Tertiary valley fill deposits in the Gallatin Valley. The upper elevations of the Gallatin Range are composed mainly of Tertiary-age volcanic rocks from the Absaroka-Gallatin field.

In the Belgrade area, thick deposits of alluvium accumulated as the Three Forks Basin continued to subside. Concurrently, alluvial fans formed along the Bridger and Gallatin ranges, and the hills in the Camp Creek area southeast of Belgrade were eroded and terraced. In late Pleistocene time, these alluvial fans were dissected and new fans, including portions of the “Bozeman Fan” south of Bozeman, were deposited. Alluvium continued to accumulate in the Belgrade basin to a depth of 400 to 600 feet (120 to 180 m).

The Pleistocene was also a time of intense glacial activity, which affected most of the mountainous areas in Gallatin County. Evidence of two separate events, named the Bull Lake and Pinedale glaciations, can be identified in this part of Montana. Bull Lake glaciation is estimated to have occurred between 250,000 and 130,000 years ago. Pinedale glaciation was active from 70,000 to 12,000 years ago, with major peaks at 30,000 and 15,000 years before present. During these episodes, alpine glaciers surrounded the high peaks, eroding U-shaped valleys and depositing linear moraines and glacial outwash at lower elevations. Deposits of glacial till and outwash mantle the floors of many of the mountain valleys and are especially well preserved along Fairy Creek in the Bridger Range and in the Spanish Creek Basin. Periglacial processes (significant frost action) are ongoing in the high mountains today; however, there are no true glaciers. There are snowfields at high elevations in most of the ranges and active rock glaciers in the Madison Range.

## Geologic Units

The sequence of rocks exposed in the survey area is summarized below, listed in order of decreasing age. Rock units are classified as formations based on lithology and stratigraphic position, and they may be subdivided into members or combined into groups or supergroups. 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. Typical soils are listed where there are sufficient exposures of a particular formation to characterize the soils.

### **Precambrian Age—4.5 billion to 570 million years before present (mybp)**

The oldest rocks in Gallatin County belong to the basement complex of Archean, or early Precambrian (3.8 to 2.5 bybp), which contains amphibolite gneiss, mica schist, and pegmatite of varying composition. These rocks are exposed in the Spanish Peaks, the southwestern end of the Bridger Range, and parts of the Madison River Valley. Typical soils derived from these metamorphic rocks include the Barbarella, Bielenberg, Breeton, Jaegje, Nuley, Poin, Rentsac, Rochester, and Shurley series.

The Proterozoic, or late Precambrian (2.5 by to 570 mybp) Belt Supergroup, which contains argillite, quartzite, limestone, and dolomite, follows the Archean. These sediments often show well-preserved features such as ripple marks and mud cracks. The Belt Supergroup crops out in the Big Belt Mountains, the southern Horseshoe Hills, and the northern end of the Bridger Range. Soils derived from these rocks are the Blaincreek, Tolbert, Tolex, and Uinta series.

The mid-Proterozoic LaHood Formation, found in the Bridger Range and the Horseshoe Hills, consists of sandstone and conglomerate shed from older, basement complex gneiss and schists. Representative soils formed in this formation include the Catgulch and Sawicki series.

### **Early to Late Paleozoic Era—570 to 300 mybp**

During the time from the Cambrian to the early Pennsylvanian periods, which occurred between 570 and 300 million years ago, oscillating seas invading from the west covered most of Montana with beach sands and thick marine deposits.

The rocks of the Cambrian Period (570 to 505 mybp) have been divided into the following: Flathead (sandstone and shale), Wolsey (shale), Meagher

(limestone), Park (shale), Pilgrim (limestone), and Snowy Range (limestone and shale) formations. The carbonate rocks form resistant ridges, most notably the crest of the Bridger Range. The less-resistant shales form swales between carbonate rock outcrops.

Most Ordovician-age (505 to 438 mybp) sediments have been eroded, and Silurian-age (438 to 408 mybp) rocks were apparently never deposited here.

Rocks from the Devonian Period (408 to 360 mybp) have been divided into the Maywood (dolomite), Jefferson (limestone), Three Forks (dolomite), and Sappington (siltstone) formations. Mississippian-age (360 to 320 mybp) rocks consist of the Lodgepole and Mission Canyon limestones, which are combined into the Madison Group, and the lower Amsden (shale) Formation. Typical soils mapped in limestone include the Crago, Hanson, Lap, Musselshell, Pensore, Whitecow, Whitore, and Windham series. The Accola, Hanson, Tiban, and Whitore series are often associated with the Amsden Formation.

#### **Late Paleozoic to Early Mesozoic Eras—300 to 100 mybp**

During this time, oscillating seas were largely restricted to southern Montana. These seas were closer to landmasses than earlier Paleozoic seas and received more river-transported sediment. Both marine and nonmarine shale, sandstone, and minor limestone were deposited. As the seas retreated, shales and sandstones were deposited on coastal flood plains and in freshwater lakes.

Rocks of the upper Pennsylvanian Period (300 to 286 mybp) include the Amsden (shale) and Quadrant (sandstone) formations. The Quadrant Formation is a prominent ridge-former in some areas. Soils formed on the Quadrant Formation include the Castner, Cowood, Danaher, Loberg, Rocko, Stemple, Tolbert, and Vision series.

The Permian Period (286 to 245 mybp) is represented by the Phosphoria Formation, which consists of dolomite, limestone, and phosphatic shale.

The Jurassic System (208 to 144 mybp) has been divided into the Sawtooth (shale), Rierdon (calcareous shale and limestone), Swift (sandstone), and Morrison (siltstone and shale) formations. Typical soils on the Morrison Formation are the Accola, Hanson, and Whitore series.

Rocks from the lower Cretaceous Period (144 to 100 mybp) include the Kootenai Formation (conglomerate and sandstone) and the Colorado Group. The Colorado Group has been subdivided into the Thermopolis (shale), Muddy (sandstone), Albino

(shale), Frontier (shale), and Cody (shale) formations. These shales are often involved in landslides. Typical soils on the Kootenai Formation include the Cowood, Loberg, Tolbert, and Vision series. Soils formed in the Colorado Group include the Bacbuster, Bangtail, Cabba, Castner, Ouselfal, Reedwest, Tolbert, Wilsall, and Yellowmule series.

#### **Late Mesozoic Era (Upper Cretaceous Period)—100 to 65 mybp**

Most of Montana was again covered by oscillating seas that advanced to the west and deposited thick sequences of shale. The Montana Group, which includes the Telegraph Creek (shale) and Eagle (shale and sandstone) formations, represents the Late Mesozoic Era. The upper Cretaceous Livingston Group includes the Cokedale (andesitic siltstone and bentonite), Miner Creek (andesitic siltstone and sandstone), and Billman Creek (shale and siltstone) formations. These shales and sandstones are also involved in landslide deposits, especially in the Bozeman area. Soils formed in these sediments include the Bangtail, Billman, Burnel, Wilsall, and Yellowmule series.

#### **Early Cenozoic Era—65 to 37 mybp**

The Early Cenozoic was a time of intense structural activity that included the formation of the Rocky Mountains. There was extensive volcanism at this time, which affected the Rocky Mountains and some of the plains mountains as well. As the mountains rose and the Late-Cretaceous seas withdrew, they deposited an eastward-thinning wedge of sandstone with some clayey shale along the coastline.

The Tertiary Period (66 to 1.6 mybp) has been subdivided into five epochs. The earliest, the Paleocene Epoch (66 to 58 mybp), is represented by the Hoppers Formation (sandstone) of the upper Livingston Group and the Fort Union Formation (conglomerate, sandstone, and siltstone). Soils mapped in the Hoppers and Fort Union formations include the Copenhaver, Hoppers, and Timberlin series.

The Paleocene Epoch was followed by the Eocene Epoch (58 to 37 mybp), which is locally represented by the Absaroka-Gallatin Volcanic Field. These thick andesite lavas, flow breccias, and terrestrial sediments cover much of the Gallatin Range but are outside of the soil survey area. Deposition of these sediments and volcanic rocks continued throughout the Tertiary Period and into the Holocene Period.

### Mid-Late Cenozoic Era (37 mybp to present)

By the end of Eocene time, the ancestral Rocky Mountains had largely been leveled by erosion. Tensional block faulting followed this leveling. Tensional block faulting uplifted mountains and down dropped valleys, forming the present-day topography of Montana. Faulting intermittently blocked drainages in the valleys, producing thick deposits of soft sediments. Ongoing volcanic activity resulted in large interbeds of volcanic ash within the valley fill sediments.

The late Tertiary Period consists of the Oligocene (37 to 24 mybp), Miocene (24 to 5.3 mybp), and Pliocene (5.3 to 1.6 mybp) epochs. During the Oligocene and Miocene, the Bozeman Group of sedimentary formations was deposited in the intermountain valleys. The Bozeman Group consists of the Renova Formation and the overlying Sixmile Creek Formation. The Renova Formation consists of a thick sequence of fine-grained, low energy, fluvial sediments that include freshwater limestone, mudstone, siltstone, and some conglomerate. The late Miocene Sixmile Creek Formation is composed of fine- to coarse-grained, volcanoclastic, fluvial sandstone, and conglomerate. The change in sediment texture from the Renova Formation to the Sixmile Creek Formation shows a change from low-energy depositional environments in the Oligocene to higher energy depositional environments in the late Miocene. Typical soils associated with these deposits are the Amesha, Cabba, Cabbart, Headwaters, and Udecide series.

The Huckleberry Ridge Tuff Volcanics, deposited during the late Pliocene, form resistant plateaus that overlie shales and sandstones along the West Fork of the West Gallatin River. These areas are prone to slumping and landslides, especially around springs and seeps. Soils found in these volcanics include the Arcette, Cowood, Lonniebee, and Ouselfal series.

The Quaternary Period is divided into the Pleistocene (1.8 my to 10,000 years before present) and the Holocene (10,000 years to present) epochs. Local volcanism and the deposition of extensive gravel outwash, which now form gravel terraces, characterized the early Quaternary Period. Soils found in gravel terraces include the Amesha, Anceny, Trimad, and Windham series.

Extensive glaciation took place during several intervals within the Pleistocene Epoch. Glacial deposits from the Bull Lake and older periods of glaciation consist of poorly sorted and highly weathered till and outwash. Glacial deposits from the more recent Pinedale glacial period consist of less weathered till and outwash. Lacustrine sediments

found in the Gallatin Canyon were formed in lakes, possibly created by ice dams or landslides during both glacial periods. Soils formed in glacial till and outwash include the Bridger, Libeg, Loberg, and Stemple series.

Toward the end of the Pleistocene, a drier climate prevailed and much of the glacial outwash was reworked and deposited as loess. This loess mantles much of the valley today in deposits of varying thickness.

The Holocene Epoch has been typified by incision into Pleistocene mountain front deposits, with some flood plain deposition in the basins. Colluvium has also been deposited on steep mountain slopes throughout the Holocene. This process of erosion and deposition continues today.

Many of the important agricultural soils in the Gallatin Valley are formed in calcareous loess. Soils formed in loess include the Amsterdam, Bigbear, Blackdog, Brocko, Danvers, Kelstrup, and Quagle series. Some soils formed in recent alluvium are the Attewan, Beaverell, Beaverton, Beavwan, Chinook, Hyalite, Kalsted, and Turner series.

### Mineral Resources

Early in its history, Gallatin County had short periods of intense mining activity. At present, there is very little active mining of minerals in the survey area. Production of cement from limestone quarried at Trident, along the Missouri River, is the largest mining operation in the survey area. As of 1992, the mine employed 100 people with an annual payroll of 3-million dollars.

Placer mining for gold occurred sporadically in the Gallatin Canyon from 1900 to 1945, mainly in Taylor Creek (locally known as Taylor's Fork) and the West Fork of the Gallatin River. In 1916, the Gallatin River Canyon was surveyed as possible dredge ground. The reports were optimistic and declared it another Alder Gulch. The area, however, never yielded gold ore to meet these expectations.

The northern end of the Madison Range, including parts of the Gallatin Canyon, contains deposits of asbestos, corundum, and kyanite. Some asbestos mining took place at the Karst Mine near Asbestos Creek, a tributary of the West Gallatin River, during the early to mid-1900s. Discovered in 1903 by Pete Karst, the mine yielded 1,800 tons of ore by 1938. Additional prospects, located on Table Mountain, were apparently never worked.

Hard-rock mining and exploration has been very limited in Gallatin County. Lead-zinc prospects are found in Hyalite Canyon and in the northern part of

the Bridger Range along Pass Creek and Johnson Creek. The September Morn, a lead-silver mine in the Pass Creek area, produced 37 tons of ore from 1939 to 1940 but has since been abandoned.

Seams of coal found in Cretaceous sediments have been mined in the Bozeman Pass area in both Gallatin and Park counties. The mining area was divided into Trail Creek Field and the Cokedale, Timberline, Meadowcreek, and Chestnut districts. The Timberline District opened in 1883 and produced 300 tons per day until 1895. Most of the mines were abandoned by the early 1900s. Generally, the deposits are high-grade bituminous coal that were processed locally and used to supply the Northern Pacific Railway and the Washoe Coal and Copper Company with steam engine fuel. Ruins of the coke ovens and mine workings are still visible today south of Interstate 90 along the Bozeman Pass.

The Belgrade area contains an abundance of sand and gravel deposits, which are used for aggregate in the construction industry. Hard rock quarry sites located throughout the county produce rock for building materials, railroad ballast, and riprap for stream erosion control.

**Ground Water Resources**

Most of the water for irrigation and domestic use in the Gallatin Valley comes from surface water sources. These sources are available during the growing season for a limited time, depending on the duration and amount of precipitation. The city of Bozeman relies on treated surface water for domestic use and for irrigation of parks and university grounds. Treatment of surface water is expensive and the supply is often insufficient to meet the demand during dry periods. This situation has generated interest in further development of ground water for both municipal and agricultural uses.

The principal aquifer systems are composed of Quaternary sediments that overlie older Tertiary deposits. Two of the more important aquifers are the Bozeman Fan and the Belgrade basin. The Bozeman Fan is apparently a true alluvial fan only near its source above the 5,080-foot (1,550-m) contour line. Below this line, the toe of the fan is probably an older surface eroded into Tertiary basin-fill (Custer, 1991). Tertiary-age sediments typically have lower yields but are a very important source of ground water for home sites along the western slope of the Bridger Range, the Gallatin Front, Sourdough Ridge, Gooch Hill, and the Camp Creek Hills. These areas have limited and

very deep water wells and may experience problems with water availability as development continues.

Recharge of these aquifers is primarily by infiltration from stream and irrigation water and also by precipitation and snowmelt. Extensive diversion and transport of surface water has created large areas in the valley where depth to ground water is less than 10 feet (3 m) from the surface. Alluvial fans thinning above impermeable layers or where streams and drains intersect the water table are areas where ground water is discharged at the surface. Ground water discharge at the surface commonly occurs to the north and west of Belgrade and along the distal edge of the Bozeman Fan at the 5,080-foot contour.

Considerable development of home sites has taken place recently on the Bozeman Fan. This formation consists of a thick sequence of gravel, cobbles, and sand over a relatively impermeable layer of Tertiary sediments. Over much of the fan, ground water is less than 10 feet and may be as shallow as 3 to 5 feet below the surface. The potential for contamination from domestic septic systems is high in this area, especially in older shallow wells. Soils formed in flood plain areas or having high water tables include the Enbar, Fairway, Lamoose, Meadowcreek, Rivra, Ryell, and Tetonview series.

Well use, current to December, 1993, for Gallatin County is summarized below. This information was provided by the Montana Ground Water Information Center in Butte, Montana. 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.

<b>TOTAL WELLS</b> .....	7,363
Domestic .....	6,140
Stockwater .....	1,118
Irrigation .....	372
Commercial .....	112
Monitoring .....	98
Public Water Supply .....	83
Industrial .....	64
Other .....	32
Institutional .....	24
Fire Protection .....	7
Research .....	2
Abandoned .....	1

**Seismic Activity**

Gallatin County is located within the northern Rocky Mountain Seismic Belt, which trends northwestward through western Montana. This belt is

characterized by shallow seismicity, earthquake swarms, and normal fault scarps with evidence of recent movement. Areas of current seismic activity include Hebgen Lake, Three Forks, and the Clarkstone Valley. Hebgen Lake is the most seismically active zone in the lower 48 states outside of California. The 1959 earthquake at Hebgen Lake rated 7.5 on the Richter Scale, which resulted in the death of several nearby campers and created Quake Lake in Madison County. In 1929, there was a 6.8 Richter-magnitude earthquake centered in the Clarkston Valley, north of Logan. This earthquake damaged buildings in Logan and Three Forks and as far away as White Sulphur Springs. The area within 10 km of Three Forks has consistently produced quakes over the last decade in the 3.5 to 3.9 range (Michael Stickney, personal communication). This ongoing seismic activity implies that Basin-and-Range type extensional forces are still at work in southwestern Montana.

## Climate

Summertime in Gallatin County is generally pleasant, with cool nights; moderately warm, sunny days; and slight to moderate breezes. Most rainfall is in the form of showers or thunderstorms and usually occurs in the late spring or early summer months. Most summers pass with the highest temperatures failing to reach 100 degrees, and an average year will have only 15 days with maximums of 90 degrees or higher. Weather stations at Belgrade Airport, Montana State University, and the Arthur Post Research Farm show freezing does not occur in July, rarely in mid-June or August, and more often in May and September. However, on rare occasions frost may occur in low-lying areas at any time of the year.

The severity of winter weather varies widely within the county. Low elevation areas in the western part of

the county receive less snow, and temperatures are milder than the higher elevation foothills and mountains surrounding Bozeman. Subzero cold waves are common in the winter, and these periods may last for several days.

The "Temperature and Precipitation" table gives data on temperature and precipitation for Gallatin County. The "Freeze Dates in Spring and Fall" table gives probable dates of the first and last freezing periods in the spring and fall. The "Growing Season" table provides data on the length of the growing season.

Differences in the amount of precipitation are considerable within Gallatin County. The wettest areas are located in the mountains, foothills, and high valleys near Bozeman where total snowfall may range from 50 to over 200 inches per year. Rain usually falls in the spring and early summer months. Hail is observed occasionally during summer rain squalls and thunderstorms.

Although the average annual precipitation is low enough to classify most of the area as semi-arid, it is important to note that about 70 percent of the annual total precipitation normally falls during the April to September growing season. It is for this reason that Gallatin County is one of the most productive small-grain growing regions of Montana. The combination of ideal temperatures during the growing season, long hours of summer sunshine, and 7 to 10 inches of precipitation from May through September make the climate favorable for dryland farming. Heavy fog seldom occurs and is limited to about one or two days per month, lasting only a small part of the day. Although the area does receive slight to moderate average wind speeds, strong or extremely strong winds of over 70 mph are not commonly observed. Normal visibility is excellent.

## Temperature and Precipitation

(Recorded in the period 1961-1995 at Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT.)

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have--		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have--		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
BELGRADE AIRPORT:											
January-----	29.3	6.4	17.9	54	-34	2	0.61	0.25	0.92	1	7.4
February-----	35.8	13.2	24.5	59	-27	6	0.48	0.22	0.70	1	4.7
March-----	43.1	19.7	31.4	69	-16	30	1.06	0.57	1.49	3	8.4
April-----	54.4	28.9	41.6	80	8	126	1.35	0.72	1.92	4	6.3
May-----	64.4	37.4	50.9	86	22	346	2.44	1.53	3.25	6	2.3
June-----	74.0	44.5	59.3	94	31	576	2.49	1.24	3.57	6	0.1
July-----	83.9	49.2	66.6	98	35	823	1.22	0.38	1.91	3	0.0
August-----	82.8	47.9	65.3	99	33	786	1.23	0.61	1.76	3	0.0
September---	70.1	38.8	54.5	92	22	440	1.46	0.62	2.26	4	0.5
October-----	58.2	29.3	43.8	82	8	177	1.19	0.49	1.78	3	2.2
November----	41.0	17.9	29.4	66	-16	25	0.83	0.44	1.17	3	5.8
December----	31.0	8.1	19.6	56	-30	5	0.57	0.28	0.81	2	6.7
Yearly:											
Average---	55.7	28.4	42.1	---	---	---	---	---	---	---	---
Extreme---	103.0	-46.0	---	101	-38	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,343	14.93	12.00	17.22	39	44.3
BOZEMAN 12 NE:											
January-----	32.3	8.2	20.3	54	-34	3	2.66	1.60	3.61	7	38.1
February-----	36.4	11.2	23.8	56	-31	4	1.92	1.16	2.61	6	28.0
March-----	40.9	15.0	27.9	62	-22	9	2.63	1.62	3.55	7	38.1
April-----	48.6	22.9	35.7	71	-3	42	3.47	2.23	4.59	9	30.7
May-----	58.1	30.4	44.3	78	13	168	4.46	3.26	5.57	10	11.6
June-----	66.8	36.7	51.7	84	24	355	4.41	2.79	5.87	9	1.4
July-----	75.0	39.7	57.3	88	28	536	2.27	0.91	3.42	5	0.1
August-----	74.8	38.2	56.5	89	27	511	2.47	1.18	3.59	5	0.3
September---	64.0	32.0	48.0	84	13	262	3.05	1.14	4.63	6	3.7
October-----	54.0	25.9	40.0	75	-1	106	2.77	1.38	3.99	6	13.2
November----	39.6	16.7	28.1	62	-16	12	2.77	1.75	3.69	7	28.2
December----	32.9	9.2	21.1	54	-30	4	2.38	1.45	3.22	8	34.8
Yearly:											
Average---	51.9	23.8	37.9	---	---	---	---	---	---	---	---
Extreme---	95.0	-47.0	---	90	-40	---	---	---	---	---	---
Total-----	---	---	---	---	---	2,013	35.26	30.31	39.88	85	228.2

See footnote at end of table.

Temperature and Precipitation--Continued

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have—		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have—		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
BOZEMAN 6 W EXPERIMENT FARM:											
January-----	32.8	11.6	22.2	55	-26	5	0.56	0.29	0.80	1	9.8
February-----	38.0	16.3	27.2	58	-21	9	0.48	0.23	0.72	1	7.2
March-----	45.3	22.4	33.8	67	-9	39	1.13	0.66	1.54	3	12.8
April-----	55.0	29.7	42.4	78	7	146	1.63	0.95	2.25	5	9.6
May-----	64.6	37.6	51.1	84	22	353	2.77	1.76	3.69	7	1.7
June-----	73.3	44.2	58.7	91	31	563	2.74	1.54	3.81	7	0.2
July-----	80.9	48.6	64.7	93	35	768	1.57	0.68	2.32	4	0.0
August-----	80.9	47.3	64.1	94	34	748	1.35	0.73	1.91	3	0.1
September---	70.4	39.6	55.0	90	22	455	1.64	0.65	2.47	4	0.5
October-----	58.0	31.1	44.6	79	7	200	1.46	0.79	2.06	4	4.3
November----	41.7	20.6	31.1	66	-13	31	0.92	0.52	1.27	3	9.3
December----	33.6	12.4	23.0	57	-22	8	0.58	0.28	0.84	1	9.6
Yearly:											
Average---	56.2	30.1	43.2	—	—	—	—	—	—	—	—
Extreme---	100.0	-39.0	—	95	-31	—	—	—	—	—	—
Total-----	—	—	—	—	—	3,324	16.85	14.63	18.87	43	64.9
BOZEMAN MSU:											
January-----	33.1	13.3	23.2	55	-21	5	0.86	0.45	1.23	2	13.3
February-----	38.5	18.3	28.4	58	-16	10	0.64	0.31	0.93	2	9.8
March-----	44.8	23.2	34.0	67	-6	43	1.42	0.83	1.94	4	17.4
April-----	54.8	30.9	42.8	77	11	155	2.01	1.27	2.67	5	14.1
May-----	64.3	39.3	51.8	83	24	375	3.17	2.08	4.16	7	4.6
June-----	73.4	46.4	59.9	91	32	598	2.94	1.65	4.08	7	0.3
July-----	81.9	51.9	66.9	94	38	834	1.52	0.66	2.26	4	0.0
August-----	81.3	50.5	65.9	94	36	802	1.50	0.78	2.13	4	0.1
September---	70.0	41.6	55.8	89	23	481	1.88	0.70	2.86	4	1.2
October-----	59.1	33.2	46.2	80	11	239	1.65	0.85	2.35	4	5.6
November----	42.3	22.7	32.5	65	-7	37	1.20	0.65	1.68	3	12.1
December----	34.2	14.9	24.6	56	-19	8	0.73	0.40	1.02	2	11.9
Yearly:											
Average---	56.5	32.2	44.3	—	—	—	—	—	—	—	—
Extreme---	99.0	-32.0	—	95	-26	—	—	—	—	—	—
Total-----	—	—	—	—	—	3,586	19.51	16.80	21.91	48	90.4

See footnote at end of table.

## Temperature and Precipitation--Continued

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have--		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have--		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
HEBGEN DAM:											
January-----	21.4	1.9	11.6	39	-37	0	3.20	1.88	4.39	11	46.3
February-----	28.0	5.1	16.5	44	-32	0	2.43	1.47	3.29	8	34.1
March-----	36.5	11.7	24.1	53	-25	0	2.64	1.25	3.83	8	31.0
April-----	46.5	22.2	34.4	67	-3	29	1.98	0.85	2.93	5	11.4
May-----	59.1	31.5	45.3	78	15	188	2.72	1.86	3.51	7	3.0
June-----	68.7	38.6	53.6	85	27	403	3.31	1.91	4.55	8	0.5
July-----	78.0	43.5	60.7	89	32	627	1.94	1.08	2.70	5	0.0
August-----	77.0	42.4	59.7	88	31	595	1.92	0.73	2.92	5	0.0
September---	66.4	35.4	50.9	83	15	326	2.01	0.80	3.14	5	0.4
October-----	52.2	27.7	39.9	72	7	92	1.71	0.58	2.63	4	5.0
November----	33.2	17.4	25.3	54	-10	2	2.77	1.64	3.77	8	29.9
December----	22.2	4.4	13.3	40	-30	0	3.32	1.91	4.57	10	48.2
Yearly:											
Average---	49.1	23.5	36.3	—	—	—	—	—	—	—	—
Extreme---	92.0	-45.0	—	89	-39	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,263	29.94	25.00	34.32	84	209.8
WEST YELLOWSTONE:											
January-----	23.8	0.7	12.2	41	-43	0	2.13	0.96	3.14	7	32.1
February-----	30.6	3.9	17.2	47	-36	0	1.66	0.92	2.31	5	25.3
March-----	37.7	10.6	24.1	56	-26	1	1.69	0.85	2.42	5	22.1
April-----	46.3	20.4	33.3	68	-6	20	1.68	0.85	2.40	5	12.9
May-----	58.5	29.5	44.0	80	13	165	2.04	1.32	2.69	6	3.3
June-----	68.4	36.7	52.5	87	24	380	2.45	1.45	3.34	7	0.3
July-----	78.0	41.0	59.5	90	28	606	1.75	0.88	2.51	5	0.0
August-----	76.4	38.9	57.7	90	25	547	1.51	0.53	2.32	4	0.0
September---	65.2	30.5	47.8	84	12	256	1.70	0.54	2.64	4	0.8
October-----	51.6	22.4	37.0	73	-2	54	1.41	0.53	2.22	3	7.8
November----	33.5	12.0	22.7	55	-24	1	2.10	0.98	3.07	6	27.1
December----	23.6	1.5	12.6	41	-38	0	2.37	1.10	3.45	7	35.2
Yearly:											
Average---	49.5	20.7	35.1	—	—	—	—	—	—	—	—
Extreme---	96.0	-60.0	—	92	-47	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,031	22.47	16.94	25.56	64	166.8

\* 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 Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT.)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
<b>BELGRADE AIRPORT:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 16	May 24	June 27
2 years in 10 later than----	May 10	May 19	June 19
5 years in 10 later than----	April 29	May 9	June 3
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 16	September 5	August 28
2 years in 10 earlier than--	September 22	September 11	September 2
5 years in 10 earlier than--	October 3	September 21	September 12
<b>BOZEMAN 12 NE:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	June 4	July 9	July 31
2 years in 10 later than----	May 29	July 1	July 25
5 years in 10 later than----	May 18	June 17	July 13
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 3	August 16	July 31
2 years in 10 earlier than--	September 7	August 23	August 6
5 years in 10 earlier than--	September 17	September 3	August 15

## Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
BOZEMAN 6 W EXPERIMENT FARM:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 9	May 24	June 24
2 years in 10 later than----	May 5	May 18	June 17
5 years in 10 later than----	April 26	May 7	June 4
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 16	September 7	August 31
2 years in 10 earlier than--	September 22	September 12	September 4
5 years in 10 earlier than--	October 4	September 22	September 12
BOZEMAN MSU:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 10	May 18	June 12
2 years in 10 later than----	May 4	May 13	June 6
5 years in 10 later than----	April 24	May 4	May 25
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 26	September 13	September 1
2 years in 10 earlier than--	October 1	September 19	September 7
5 years in 10 earlier than--	October 12	October 1	September 17

Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
<b>HEBGEN DAM:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 27	June 17	July 4
2 years in 10 later than----	May 21	June 10	June 29
5 years in 10 later than----	May 11	May 29	June 20
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 12	September 3	August 13
2 years in 10 earlier than--	September 17	September 7	August 19
5 years in 10 earlier than--	September 28	September 15	September 1
<b>WEST YELLOWSTONE:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	June 12	July 11	July 22
2 years in 10 later than----	June 6	July 4	July 16
5 years in 10 later than----	May 25	June 20	July 6
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	August 30	August 13	August 2
2 years in 10 earlier than--	September 4	August 18	August 8
5 years in 10 earlier than--	September 12	August 28	August 18

## Growing Season

(Recorded in the period 1961-1995 at Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT)

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
BELGRADE AIRPORT:			
9 years in 10-----	131	111	69
8 years in 10-----	140	119	80
5 years in 10-----	157	134	100
2 years in 10-----	173	149	120
1 year in 10-----	182	157	130
BOZEMAN 12 NE:			
9 years in 10-----	98	45	5
8 years in 10-----	106	56	15
5 years in 10-----	121	77	32
2 years in 10-----	135	99	50
1 year in 10-----	143	110	59
BOZEMAN 6 W EXPERIMENT FARM:			
9 years in 10-----	134	113	78
8 years in 10-----	143	122	86
5 years in 10-----	160	137	99
2 years in 10-----	177	153	113
1 year in 10-----	186	161	120

Growing Season--Continued

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
BOZEMAN MSU:			
9 years in 10-----	146	125	88
8 years in 10-----	154	133	97
5 years in 10-----	171	149	114
2 years in 10-----	187	165	132
1 year in 10-----	196	174	141
HEBGEN DAM:			
9 years in 10-----	114	86	48
8 years in 10-----	123	93	56
5 years in 10-----	139	107	72
2 years in 10-----	156	121	88
1 year in 10-----	164	129	96
WEST YELLOWSTONE:			
9 years in 10-----	88	44	18
8 years in 10-----	95	52	26
5 years in 10-----	110	69	42
2 years in 10-----	125	85	57
1 year in 10-----	133	94	65



# Formation and Classification of the Soils

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This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The "Classification of the Soils" table at the end of this section shows 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 physical and chemical composition of the parent material, the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, 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 Gallatin County Area.

## Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. In the Gallatin County Area, winters are cold; springs are cool and moist; and summers are hot and dry. 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 west-central part of the survey area, the average annual precipitation ranges from 10 to 14 inches within elevations of approximately 3,900 to 4,800 feet. Precipitation from 15 to 19 inches occurs in other parts of the county where elevations are 4,700 to 6,000 feet, and 20 to 30 inches of precipitation occurs above 6,000 feet. The average annual temperature ranges from 32 to 45 degrees. The lower temperatures are in areas above 6,000 feet, and the higher temperatures are in areas below this elevation.

## 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 badgers, ground squirrels, mice, rabbits, and voles.

Vegetation in the survey area consists mainly of short grasses, mid grasses, and shrubs on the rangeland and Douglas-fir, Engelmann spruce, lodgepole pine, and subalpine fir with shrub understories in the forests.

## 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. Topography in this survey area can be distinctively separated into mountains and intermountain valleys. The mountains rise 3,000 to 4,000 feet above the valleys and are moderately steep to very steep with numerous drainageways. The intermontane valleys are nearly level to gently sloping with occasional areas of steep hills.

The topography of the Gallatin County Area closely affects the local climate. The amount of precipitation and air temperatures can have wide variations within short distances.

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 principle are the Cowood soils on very steep slopes and the Danaher soils that are moderately sloping.

In the valleys, the number and distinctness of soil horizons generally decrease as slope increases. Examples of this general principle are the Anceny soils that are steep and very steep and the Blackdog soils that are nearly level to strongly sloping.

### Parent Material

Soils have formed in a number of parent materials in the Gallatin County Area. Most of the soils in the valleys formed in mixed alluvium or loess. The mountains and bedrock-controlled hills may have soils formed in one of the following parent materials: limestone, gneiss and schist, quartzite, argillite, sandstone, shale, or igneous volcanics.

A single parent material under the influence of varying precipitation amounts exhibits marked changes in soil development. Generally silty soils that formed in loess, such as Blackmore and Brocko soils, are examples of this principle. Other examples are generally loamy and high in rock fragment-content soils that formed in limestone, such as Crago and Hanson. Generally sandy soils formed in gneiss and schist, such as Barbarela and Nuley soils, and generally clayey soils are found in shale, such as Bangtail and Tanna soils.

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

### Time

Change taking place in soils over a long period of time 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 layers are called the soil morphology. These layers are described in terms of color, texture, structure, consistence, thickness, permeability, and chemistry.

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

Young soils show very little profile development. Ryell sandy loam, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a flowing stream. The soil contains little organic matter to form an A horizon; it has little clay accumulation and little translocation of carbonates within the profile.

The Turner soil formed in parent material that is similar to that of the Ryell sandy loam but is much older. These soils formed in alluvium on uplands. They contain enough organic matter to have a dark-colored A horizon, a distinct clay accumulation in a Bt horizon, and nearly all of the carbonates have been leached to a depth of about 12 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 Ustoll (Ust, meaning burnt, plus oll, from Mollisol).

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

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other

orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiustolls.

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

**SERIES.** The series consists of soils within a family that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. An example is the Blackdog series. The Blackdog series is a fine-silty, mixed, superactive, frigid Typic Argiustoll.

## Soil Series and Detailed Map Units

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

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 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, very stony loam is a phase of the Sawicki 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. Amsterdam-Quagle silt loams, 0 to 4 percent slopes, is an example.

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

The table, "Acreage and Proportionate Extent of the Soils," in Part 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. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

### Abor Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Very slow

*Landform:* Hills

*Parent material:* Semiconsolidated, clayey sedimentary beds

*Slope range:* 2 to 45 percent

*Elevation range:* 4,150 to 5,300 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine, smectitic, frigid Aridic Leptic Haplusterts

### Typical Pedon

Abor cobbly clay loam in an area of Abor-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 2,000 feet north and 600 feet east of the southwest corner of sec. 12, T. 1 N., R. 1 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) cobbly clay loam, grayish brown (2.5Y 5/2) moist; weak medium granular structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; 15 percent cobbles and

5 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bss—3 to 12 inches; light gray (2.5Y 7/2) silty clay, light brownish gray (2.5Y 6/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, very sticky, and very plastic; many very fine and fine roots; few slickensides; slightly effervescent; moderately alkaline; clear smooth boundary.

Bky—12 to 25 inches; light gray (5Y 7/2) silty clay, pale olive (5Y 6/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, and very plastic; few very fine roots; common fine masses of lime and gypsum; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—25 to 60 inches; semiconsolidated siltstone and shale.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bky horizon:* 10 to 18 inches

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

*Note:* These soils have cracks extending to over 50 cm deep and 1 to 5 cm wide.

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 1, 2, 3, or 4 (chromas of 1 derived from parent material)

Clay content: 35 to 40 percent

Content of rock fragments: 15 to 35 percent—10 to 20 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 7.4 to 9.0

#### Bss horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 1, 2, 3, or 4

Texture: Silty clay, silty clay loam, or clay

Clay content: 35 to 60 percent

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

Reaction: pH 7.4 to 9.0

#### Bky horizon

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

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

Chroma: 1, 2, 3, or 4

Texture: Silty clay, silty clay loam, or clay

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): 0 to 8  
 Calcium carbonate equivalent: 5 to 15 percent  
 Gypsum content: 1 to 5 percent  
 Reaction: pH 7.4 to 9.0

## 721E—Abor-Rock outcrop complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Abor—Hills
- Rock outcrop—Hills

*Slope:* 15 to 45 percent

*Elevation:* 4,150 to 4,500 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Abor and similar soils: 55 percent

Rock outcrop: 35 percent

#### Minor Components

Patouza clay: 0 to 5 percent

Soils less than 20 inches to shale: 0 to 5 percent

### Major Component Description

#### Abor

*Surface layer texture:* Cobbly clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, clayey sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

#### Rock outcrop

*Definition:* Exposures of clayey sedimentary bedrock.

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

### Management

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

### Absarokee Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Sedimentary plains and hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 4 to 45 percent

*Elevation range:* 4,650 to 6,150 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Absarokee clay loam in an area of Farnuf-Absarokee complex, 4 to 8 percent slopes, in an area of hayland, 400 feet south and 950 feet west of the northeast corner of sec. 21, T. 3 N., R. 4 E.

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

Bt—5 to 17 inches; brown (10YR 5/3) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common fine pores; 5 percent pebbles; neutral; clear wavy boundary.

Bk—17 to 25 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; few very fine roots; many fine pores; common fine masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

R—25 inches; interbedded hard shale and sandstone.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to bedrock:* 20 to 40 inches

*Depth to the Bk horizon:* 12 to 30 inches

#### Ap horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

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

Reaction: pH 6.6 to 7.3

*Bt horizon*

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

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

Reaction: pH 6.6 to 8.4

*Bk horizon*

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

**869D—Absarokee-Tolbert complex,  
4 to 15 percent slopes**

**Setting**

*Landform:*

- Absarokee—Hills
- Tolbert—Hills

*Slope:*

- Absarokee—4 to 15 percent
- Tolbert—4 to 15 percent

*Elevation:* 5,200 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Absarokee and similar soils: 60 percent

Tolbert and similar soils: 25 percent

**Minor Components**

Soils less than 10 inches deep to bedrock: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description**

**Absarokee**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

**Tolbert**

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

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

**Management**

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

**869E—Absarokee-Tolbert-Rock outcrop  
complex, 15 to 45 percent slopes**

**Setting**

*Landform:*

- Absarokee—Hills
- Tolbert—Hills
- Rock outcrop—Hills

*Slope:*

- Absarokee—15 to 45 percent
- Tolbert—15 to 45 percent

*Elevation:* 4,950 to 6,150 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Absarokee and similar soils: 60 percent

Tolbert and similar soils: 25 percent

Rock outcrop: 10 percent

**Minor Components**

Soils with slopes more than 45 percent: 0 to 5 percent

**Major Component Description****Absarokee**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

**Tolbert**

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

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

**Management**

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

**769D—Absarokee-Work-Tolbert complex,  
4 to 15 percent slopes****Setting**

*Landform:*

- Absarokee—Hills
- Work—Hills
- Tolbert—Hills

*Slope:*

- Absarokee—4 to 15 percent
- Work—4 to 15 percent
- Tolbert—4 to 15 percent

*Elevation:* 4,950 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Absarokee and similar soils: 45 percent

Work and similar soils: 35 percent

Tolbert and similar soils: 10 percent

**Minor Components**

Soils with slopes more than 15 percent: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 3 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Absarokee**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

**Work**

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.2 inches

**Tolbert**

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

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

**Management**

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

## Absarook Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Sedimentary plains and hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 2 to 35 percent

*Elevation range:* 4,400 to 6,500 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Absarook loam, in an area of Absarook-Tolbert complex, 4 to 15 percent slopes, in an area of rangeland, 2,200 feet south and 600 feet east of the northwest corner of sec. 23, T. 4 N., R. 5 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, moderately sticky, and slightly plastic; many very fine and fine roots and common medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 14 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine subangular blocky; hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; common distinct clay films on faces of peds; 5 percent pebbles; neutral; gradual smooth boundary.

Bt2—14 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; dark yellowish brown (10YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; common distinct clay films on faces of peds; 10 percent pebbles; neutral; abrupt wavy boundary.

Bk—20 to 32 inches; light gray (10YR 6/1) channery sandy loam, gray (10YR 5/1) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine roots; 30 percent channers; common fine

masses of lime; violently effervescent moderately alkaline; abrupt clear boundary.  
R—32 inches; hard sandstone.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bt horizon:* 4 to 6 inches

*Depth to the Bk horizon:* 12 to 25 inches

*Depth to bedrock:* 20 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 10YR or 2.5Y

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

Chroma: 1, 2, 3, or 4

Texture (less than 2 mm): Sandy loam, loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent cobbles; 10 to 30 percent channers

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

### 668D—Absarook-Farnuf-Tolbert complex, 4 to 15 percent slopes

#### Setting

##### Landform:

- Absarook—Hills
- Farnuf—Hills
- Tolbert—Hills

*Slope:*

- Absarook—4 to 15 percent
- Farnuf—4 to 15 percent
- Tolbert—4 to 15 percent

*Elevation:* 5,250 to 6,050 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Absarook and similar soils: 40 percent

Farnuf and similar soils: 35 percent

Tolbert and similar soils: 10 percent

**Minor Components**

Absarokee clay loam: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Absarook***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.3 inches**Farnuf***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.0 inches**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches

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

**Management**

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

**470D—Absarook-Tolbert complex,  
4 to 15 percent slopes****Setting***Landform:*

- Absarook—Hills
- Tolbert—Hills

*Slope:*

- Absarook—4 to 15 percent
- Tolbert—4 to 15 percent

*Elevation:* 4,700 to 6,200 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Absarook and similar soils: 60 percent

Tolbert and similar soils: 25 percent

**Minor Components**

Farnuf loam: 0 to 8 percent

Castner very flaggy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Absarook***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.3 inches**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches

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

### Management

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

### Accola Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains

*Parent material:* Limestone colluvium

*Slope range:* 15 to 45 percent

*Elevation range:* 4,950 to 7,600 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

### Typical Pedon

Accola loam, in an area of Accola-Whitore, stony complex, cool, 15 to 45 percent slopes, in an area of forest land, 1,100 feet south and 400 feet east of the northwest corner of sec. 4, T. 5 N., R. 4 E.

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

A—1 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine platy structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine roots and few medium roots; 5 percent pebbles; moderately acid; clear wavy boundary.

Bt1—4 to 9 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of pedis and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

Bt2—8 to 18 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of pedis and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bk1—18 to 29 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; soft, very friable, moderately sticky, and moderately plastic; few fine and medium roots; common distinct clay films on faces of pedis and lining pores; 15 percent cobbles and 30 percent pebbles; common fine seams of lime; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—29 to 60 inches; very pale brown (10YR 7/4) extremely cobbly loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; 30 percent cobbles and 35 percent pebbles; disseminated lime; common fine masses of lime; common distinct lime coatings on underside of rock fragments; violently effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 13 inches

*Depth to the skeletal Bk horizon:* 12 to 22 inches

#### A horizon

Value: 4 or 5 dry

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 5.6 to 7.3

#### Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 25 to 35 percent

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

Reaction: pH 5.6 to 7.8

#### Bk horizons

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

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 35 to 70 percent—15 to 30 percent cobbles; 20 to 40 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 8.4

**790E—Accola-Whitore, stony complex,  
15 to 45 percent slopes****Setting***Landform:*

- Accola—Mountains
- Whitore—Mountains

*Slope:*

- Accola—15 to 45 percent
- Whitore—15 to 45 percent

*Elevation:* 4,950 to 7,300 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Accola and similar soils: 60 percent

Whitore and similar soils: 30 percent

**Minor Components**

Soils with slopes more than 45 percent: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to  
3 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Accola***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.0 inches**Whitore***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.8 inches

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

**Management**

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

**690E—Accola-Whitore, stony complex,  
cool, 15 to 45 percent slopes****Setting***Landform:*

- Accola—Mountains
- Whitore—Mountains

*Slope:*

- Accola—15 to 45 percent
- Whitore—15 to 45 percent

*Elevation:* 6,250 to 7,600 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Accola and similar soils: 60 percent

Whitore and similar soils: 35 percent

**Minor Components**Soils less than 20 inches deep to bedrock: 0 to  
4 percent

Rock outcrop: 0 to 1 percent

**Major Component Description****Accola***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.0 inches**Whitore***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.8 inches

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

**Management**

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

**Adel Series**

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Drainageways, hills, and mountains

*Parent material:* Alluvium or colluvium

*Slope range:* 2 to 60 percent

*Elevation range:* 4,400 to 7,300 feet

*Annual precipitation:* 17 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

**Typical Pedon**

Adel loam, cool, 4 to 15 percent slopes, in an area of forest land, 2,300 feet south and 50 feet east of the northwest corner of sec. 16, T. 5 N., R. 5 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly acid; gradual wavy boundary.

A2—8 to 14 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; neutral; gradual wavy boundary.

A3—14 to 22 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; neutral; gradual wavy boundary.

Bw—22 to 60 inches; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine roots; neutral.

**Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F

*Summer soil temperature:* 52 to 59 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 16 to 60 inches

**A horizons**

Hue: 2.5Y or 10YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 15 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

**Bw horizon**

Hue: 2.5Y or 10YR

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 1, 2, or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 30 percent

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

Reaction: pH 6.6 to 7.8

**614F—Adel loam, 15 to 60 percent slopes****Setting**

*Landform:* Mountains

*Slope:* 15 to 60 percent

*Elevation:* 4,750 to 6,500 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

**Composition****Major Components**

Adel and similar soils: 85 percent

**Minor Components**

Rocko stony loam: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

Zade 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:* Colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

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

### Management

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

### 314C—Adel loam, 2 to 8 percent slopes

#### Setting

*Landform:* Drainageways

*Slope:* 2 to 8 percent

*Elevation:* 5,000 to 6,700 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Adel and similar soils: 85 percent

##### Minor Components

Libeg stony loam: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Water table at 4 to 6 feet: 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.3 inches

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

#### Management

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

### 314E—Adel loam, 8 to 25 percent slopes

#### Setting

*Landform:* Hills

*Slope:* 8 to 25 percent

*Elevation:* 4,500 to 7,300 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

##### Major Components

Adel and similar soils: 90 percent

##### Minor Components

Libeg stony loam: 0 to 5 percent

Bridger loam: 0 to 2 percent

Soils with slopes more than 25 percent: 0 to 2 percent

Soils with a water table at 4 to 6 feet: 0 to 1 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.3 inches

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

#### Management

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

### 614D—Adel loam, cool, 4 to 15 percent slopes

#### Setting

*Landform:* Drainageways

*Slope:* 4 to 15 percent

*Elevation:* 5,000 to 6,550 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Adel and similar soils: 85 percent

##### Minor Components

Libeg loam: 0 to 5 percent

Redlodge silty clay loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

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

### Management

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

## 814D—Adel-Copenhaver complex, 4 to 15 percent slopes

### Setting

*Landform:*  

- Adel—Hills
- Copenhaver—Hills

*Slope:*  

- Adel—4 to 15 percent
- Copenhaver—4 to 15 percent

*Elevation:* 5,400 to 6,300 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Adel and similar soils: 60 percent  
 Copenhaver and similar soils: 25 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Adel

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

#### Copenhaver

*Surface layer texture:* Channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

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

### Management

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

## 814E—Adel-Copenhaver complex, 15 to 35 percent slopes

### Setting

*Landform:*  

- Adel—Hills
- Copenhaver—Hills

*Slope:*  

- Adel—15 to 35 percent
- Copenhaver—15 to 35 percent

*Elevation:* 5,600 to 6,300 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Adel and similar soils: 70 percent  
 Copenhaver and similar soils: 20 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Adel

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

#### Copenhaver

*Surface layer texture:* Channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

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

### Management

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

## 414E—Adel-Libeg complex, 15 to 35 percent slopes

### Setting

#### Landform:

- Adel—Hills
- Libeg—Hills

#### Slope:

- Adel—15 to 35 percent
- Libeg—15 to 35 percent

*Elevation:* 5,100 to 6,900 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Adel and similar soils: 50 percent

Libeg and similar soils: 35 percent

#### Minor Components

Copenhaver flaggy loam: 0 to 10 percent

Libeg stony loam: 0 to 5 percent

### Major Component Description

#### Adel

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.3 inches

#### Libeg

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

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

### Management

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

## 714E—Adel-Uinta loams, 8 to 35 percent slopes

### Setting

#### Landform:

- Adel—Mountains
- Uinta—Mountains

#### Slope:

- Adel—8 to 35 percent
- Uinta—8 to 35 percent

*Elevation:* 5,550 to 6,700 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Adel and similar soils: 60 percent

Uinta and similar soils: 25 percent

#### Minor Components

Danaher stony loam: 0 to 10 percent

Stemple stony loam: 0 to 5 percent

### Major Component Description

#### Adel

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

#### Uinta

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

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

### Management

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

## **Alder Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Sedimentary plains, hills, and escarpments

*Parent material:* Semiconsolidated, clayey sedimentary beds

*Slope range:* 2 to 45 percent

*Elevation range:* 4,800 to 6,400 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

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

### **Typical Pedon**

Alder cobbly clay loam, in an area of Alder-Cabba complex, 8 to 25 percent slopes, in an area of cropland, 2,200 feet north and 1,700 feet west of the southeast corner of sec. 12, T. 3 S., R. 3 E.

Ap—0 to 7 inches; dark gray (10YR 4/1) cobbly clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to strong fine granular; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and few fine roots; 10 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt—7 to 21 inches; dark gray (10YR 4/1) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; many distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bk—21 to 31 inches; light olive gray (5Y 6/2) sandy clay, olive (5Y 5/3) moist; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—31 to 60 inches; variegated, weathered, semiconsolidated, tertiary sedimentary beds; fine threads of lime; neutral.

### **Range in Characteristics**

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 14 inches

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

*Depth to the Bk horizon:* 15 to 30 inches

#### *Ap horizon*

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 35 to 40 percent

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

Reaction: pH 6.6 to 7.8

#### *Bt horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent

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

Reaction: pH 6.6 to 7.8

#### *Bk horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, clay, or sandy clay

Clay content: 30 to 50 percent

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

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

## **60C—Alder clay loam, 2 to 8 percent slopes**

### **Setting**

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Elevation:* 5,150 to 5,850 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### **Composition**

#### **Major Components**

Alder and similar soils: 90 percent

#### **Minor Components**

Cabba clay loam: 0 to 5 percent

Alder cobbly clay loam: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

### **Major Component Description**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.1 inches

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

### Management

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

## 360E—Alder, stony-Cabba complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Alder—Escarpments
- Cabba—Escarpments

*Slope:*

- Alder—15 to 45 percent
- Cabba—15 to 45 percent

*Elevation:* 5,000 to 6,400 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Alder and similar soils: 70 percent  
 Cabba and similar soils: 20 percent

#### Minor Components

Burnel loam: 0 to 8 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Alder

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

#### Cabba

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

A typical description with range in characteristics is 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—Alder-Cabba complex, 8 to 25 percent slopes

### Setting

*Landform:*

- Alder—Hills
- Cabba—Hills

*Slope:*

- Alder—8 to 25 percent
- Cabba—8 to 25 percent

*Elevation:* 4,800 to 6,300 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Alder and similar soils: 70 percent  
 Cabba and similar soils: 15 percent

#### Minor Components

Alder stony clay loam: 0 to 5 percent  
 Soils with slopes more than 25 percent: 0 to 5 percent  
 Danvers clay loam: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Alder

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.9 inches

#### Cabba

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, clayey sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

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

### Management

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

### Alona Series

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Stream terraces and alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 3,950 to 4,900 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 43 to 45 degrees F

*Frost-free period:* 100 to 120 days

**Taxonomic Class:** Fine-silty, mixed, superactive, frigid Aridic Haplustepts

### Typical Pedon

Alona silty clay loam, 0 to 4 percent slopes, in an area of cropland, 2,600 feet south and 500 feet west of the northeast corner of sec. 18, T. 3 N., R. 3 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; moderately alkaline; clear smooth boundary.

Bw—3 to 11 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—11 to 16 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common fine masses of

lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bknz1—16 to 36 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common fine masses of lime and other salts; violently effervescent; strongly alkaline; clear smooth boundary.

Bknz2—36 to 60 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common fine masses of lime and other salts; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 6 to 18 inches

*Depth to the Bknz horizon:* 16 to 36 inches

#### A horizon

Hue: 10YR or 2.5Y

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

Chroma: 2 or 3

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 2 to 10

Reaction: pH 7.9 to 8.4

#### Bw horizon

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Silty clay loam or silt loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 2 to 13

Reaction: pH 7.9 to 8.4

#### Bk horizon

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 silt loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 40

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

#### Bknz 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 silt loam  
 Clay content: 18 to 35 percent  
 Electrical conductivity (mmhos/cm): 8 to 16  
 Sodium adsorption ratio: 13 to 40  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 8.5 to 9.0

### 37B—Alona silty clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,950 to 4,900 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 100 to 120 days

#### Composition

##### Major Components

Alona and similar soils: 90 percent

##### Minor Components

Busby loam: 0 to 5 percent  
 Toston 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.5 inches

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

#### Management

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

### Amesha Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Relict stream terraces, escarpments, hills, and sedimentary plains

*Parent material:* Alluvium or colluvium  
*Slope range:* 0 to 60 percent  
*Elevation range:* 4,000 to 5,600 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

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

#### Typical Pedon

Amesha loam, 4 to 8 percent slopes, in an area of cropland, 400 feet south and 960 feet west of the northeast corner of sec. 2, T. 1 S., R. 1 E.

Ap—0 to 7 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk1—7 to 13 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—13 to 25 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—25 to 60 inches; very pale brown (10YR 8/3) loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; 10 percent pebbles; common fine and medium masses of lime; 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:* 4 to 8 inches

#### Ap horizon

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5, 6, or 7 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles  
Reaction: pH 7.4 to 8.4

*Bk horizons*

Hue: 10YR, 2.5Y, or 5Y  
Value: 6, 7, or 8 dry; 5, 6, or 7 moist  
Chroma: 2 or 3  
Texture: Loam, fine sandy loam, or silt loam  
Clay content: 10 to 18 percent—15 to 50 percent fine and coarser sands  
Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles  
Calcium carbonate equivalent: 15 to 35 percent  
Reaction: pH 7.9 to 8.4

**232C—Amesha cobbly loam,  
2 to 8 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 2 to 8 percent  
*Elevation:* 4,100 to 5,300 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Amesha and similar soils: 85 percent

**Minor Components**

Musselshell cobbly loam: 0 to 5 percent  
Soils with slopes more than 8 percent: 0 to 5 percent  
Varney sandy clay loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

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

**Management**

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

**32B—Amesha loam, 0 to 4 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Amesha and similar soils: 85 percent

**Minor Components**

Amesha cobbly loam: 0 to 5 percent  
Chinook fine sandy loam: 0 to 5 percent  
Musselshell 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

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

**Management**

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

**32C—Amesha loam, 4 to 8 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,000 to 5,400 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Amesha and similar soils: 85 percent

**Minor Components**

Amesha cobbly loam: 0 to 5 percent  
Musselshell loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent  
Headwaters loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

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

### Management

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

### 32D—Amesha loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 5,600 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Amesha and similar soils: 85 percent

##### Minor Components

Musselshell loam: 0 to 5 percent  
Soils with more than 15 percent slopes: 0 to 5 percent  
Trimad cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

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

### Management

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

### 32E—Amesha-Trimad complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Amesha—Escarpments
- Trimad—Escarpments

*Slope:*

- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

*Elevation:* 4,050 to 5,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Amesha and similar soils: 70 percent  
Trimad and similar soils: 20 percent

##### Minor Components

Varney sandy clay loam: 0 to 5 percent  
Cabbart loam: 0 to 3 percent  
Soils with an overflow range site: 0 to 2 percent

### Major Component Description

#### Amesha

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.7 inches

#### Trimad

*Surface layer texture:* Cobbly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical description with range in characteristics is 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—Amesha loam, 35 to 60 percent slopes

#### Setting

*Landform:* Escarpments

*Slope:* 35 to 60 percent

*Elevation:* 4,300 to 5,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Amesha and similar soils: 85 percent

##### Minor Components

Cabbart loam: 0 to 5 percent

Trimad cobbly loam: 0 to 5 percent

Varney sandy clay 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:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.7 inches

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

### Management

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

### Amsterdam Series

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Relict stream terraces and stream terraces

*Parent material:* Loess

*Slope range:* 0 to 15 percent

*Elevation range:* 4,400 to 5,650 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Amsterdam silt loam, 0 to 4 percent slopes, in an area of cropland, 500 feet north and 2,440 feet east of the southwest corner of sec. 7, T. 2 S., R. 5 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; hard, very friable, slightly sticky, and slightly plastic; many fine roots; neutral; clear smooth boundary.

Bw1—8 to 10 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine blocky; very hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; neutral; clear smooth boundary.

Bw2—10 to 15 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak fine and medium blocky; hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; neutral; clear wavy boundary.

Bk1—15 to 20 inches; light yellowish brown (2.5Y 6/4) silt loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure; hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; few fine masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk2—20 to 28 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium and coarse prismatic structure; hard, very friable, slightly sticky, and slightly plastic; common fine roots; many fine pores; many fine masses and threads of lime; violently effervescent; moderately alkaline; diffuse wavy boundary.

2Bk3—28 to 42 inches; pale yellow (2.5Y 7/4) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak thin platy structure; slightly hard, very friable, nonsticky, and nonplastic; few fine roots; many fine pores; common fine masses and threads of lime; violently effervescent; moderately alkaline; diffuse wavy boundary.

2C—42 to 60 inches; light yellowish brown (2.5Y 6/4) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak fine platy structure; slightly hard, very friable, nonsticky, and nonplastic; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 10 to 22 inches

*Note:* Volcanic ash influence begins at a depth of 24 to 32 inches.

#### A horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.6 to 7.3

#### Bw1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 30 percent

Reaction: pH 6.6 to 7.8

#### Bw2 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

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

Clay content: 18 to 30 percent

Reaction: pH 6.6 to 7.8

#### Bk horizons and 2Bk3 horizon

Hue: 2.5Y or 10YR

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

Chroma: 2, 3, or 4

Texture: Silt loam or very fine sandy loam

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

#### 2C horizon

Hue: 2.5Y or 10YR

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

Chroma: 2, 3, or 4

Texture: Silt loam or very fine sandy loam

Clay content: 10 to 20 percent

Reaction: pH 7.9 to 8.4

### 53B—Amsterdam silt loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,400 to 5,550 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Amsterdam and similar soils: 85 percent

#### Minor Components

Blackdog silty clay loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Bowery loam: 0 to 3 percent

Meagher cobbly 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

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

#### Management

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

### 53C—Amsterdam silt loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,450 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

#### Major Components

Amsterdam and similar soils: 85 percent

#### Minor Components

Blackdog silty clay loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Bowery loam: 0 to 3 percent

Meagher cobbly 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

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

### Management

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

### 453B—Amsterdam-Quagle silt loams, 0 to 4 percent slopes

#### Setting

##### *Landform:*

- Amsterdam—Relict stream terraces
- Quagle—Relict stream terraces

##### *Slope:*

- Amsterdam—0 to 4 percent
- Quagle—0 to 4 percent

*Elevation:* 4,400 to 5,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Amsterdam and similar soils: 60 percent

Quagle and similar soils: 30 percent

##### Minor Components

Beanlake gravelly loam: 0 to 6 percent

Meagher cobbly loam: 0 to 4 percent

#### Major Component Description

##### Amsterdam

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.1 inches

##### Quagle

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

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

### Management

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

### 453C—Amsterdam-Quagle silt loams, 4 to 8 percent slopes

#### Setting

##### *Landform:*

- Amsterdam—Relict stream terraces
- Quagle—Relict stream terraces

##### *Slope:*

- Amsterdam—4 to 8 percent
- Quagle—4 to 8 percent

*Elevation:* 4,400 to 5,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Amsterdam and similar soils: 60 percent

Quagle and similar soils: 30 percent

##### Minor Components

Beanlake gravelly loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Meagher cobbly loam: 0 to 3 percent

#### Major Component Description

##### Amsterdam

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

##### Quagle

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

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

### Management

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

## 453D—Amsterdam-Brodyk silt loams, 8 to 15 percent slopes

### Setting

#### Landform:

- Amsterdam—Relict stream terraces
- Brodyk—Relict stream terraces

#### Slope:

- Amsterdam—8 to 15 percent
- Brodyk—8 to 15 percent

*Elevation:* 4,450 to 5,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Amsterdam and similar soils: 50 percent

Brodyk and similar soils: 35 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Meagher cobbly loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Amsterdam

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

#### Brodyk

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.4 inches

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

### Management

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

## Anceney Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Escarpments, alluvial fans, and relict stream terraces

*Parent material:* Alluvium or colluvium

*Slope range:* 8 to 60 percent

*Elevation range:* 4,500 to 6,150 feet

*Annual precipitation:* 12 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Anceney cobbly loam in an area of Anceney-Trimad-Meagher complex, 15 to 60 percent slopes, in an area of rangeland, 2,200 feet south and 1,600 feet west of the northeast corner of sec. 11, T. 2 S., R. 1 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

AB—6 to 10 inches; dark brown (10YR 3/3) gravelly loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; 10 percent cobbles and 20 percent pebbles; neutral; clear wavy boundary.

Bk1—10 to 23 inches; pale brown (10YR 6/3) very gravelly loam, very dark brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine roots; 15 percent cobbles and 30 percent pebbles; few fine masses and seams of lime; common distinct lime coatings on underside of rock fragments; violently effervescent; slightly alkaline; gradual wavy boundary.

Bk2—23 to 60 inches; light brownish gray (10YR 6/3) very cobbly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 25 percent cobbles and 30 percent pebbles; common distinct lime coatings on underside of rock fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 12 inches  
*Depth to the Bk horizon:* 8 to 12 inches

#### A horizon

Value: 3 or 4 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 15 to 35 percent—10 to 20 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### AB horizon

Value: 3 or 4 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 20 to 50 percent—10 to 20 percent cobbles; 10 to 30 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### Bk1 horizon

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.4 to 8.4

#### Bk2 horizon

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 15 to 27 percent  
 Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.4 to 8.4

### 155F—Anceney cobbly loam, 15 to 60 percent slopes

#### Setting

*Landform:* Escarpments  
*Slope:* 15 to 60 percent  
*Elevation:* 4,500 to 5,900 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Anceney and similar soils: 90 percent

#### Minor Components

Meagher loam: 0 to 5 percent  
 Bowery loam: 0 to 3 percent  
 Cabba loam: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

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

#### Management

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

### 255D—Anceney cobbly loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,600 to 6,150 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

#### Major Components

Anceney and similar soils: 85 percent

#### Minor Components

Anceney very cobbly loam: 0 to 5 percent  
 Meagher loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.0 inches

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

### Management

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

## 755F—Anceney-Trimad-Meagher complex, 15 to 60 percent slopes

### Setting

#### Landform:

- Anceney—Escarpments, north aspects
- Trimad—Escarpments, south aspects
- Meagher—Escarpments

#### Slope:

- Anceney—15 to 60 percent
- Trimad—15 to 60 percent
- Meagher—15 to 35 percent

*Elevation:* 4,500 to 5,700 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Anceney and similar soils: 40 percent

Trimad and similar soils: 30 percent

Meagher and similar soils: 20 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Cabbart loam: 0 to 5 percent

### Major Component Description

#### Anceney

*Surface layer texture:* Cobbly 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 5.0 inches

#### Trimad

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.4 inches

#### Meagher

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.4 inches

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

### Management

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

## Arcette Series

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

*Drainage class:* Excessively drained

*Permeability:* Rapid

*Landform:* Mountains

*Parent material:* Igneous colluvium

*Slope range:* 15 to 35 percent

*Elevation range:* 6,250 to 7,900 feet

*Annual precipitation:* 25 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fragmental, mixed Ustic  
Eutrocryepts

### Typical Pedon

Arcette extremely bouldery sandy loam, 15 to 35 percent slopes, in an area of forest land, 2,800 feet south and 400 feet west of the northeast corner of sec. 1, T. 7 S., R. 3 E.

Oe—0 to 2 inches; moderately decomposed forest litter.

E—2 to 7 inches; light brownish gray (10YR 6/2) extremely bouldery sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few coarse roots; 25 percent boulders, 30 percent stones, and 25 percent cobbles; moderately acid; clear smooth boundary.

Bw—7 to 13 inches; light brownish gray (10YR 6/2) extremely stony sandy loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and

nonplastic; common very fine and few fine roots; 25 percent stones, 20 percent cobbles, and 25 percent pebbles; strongly acid; gradual wavy boundary.

C—13 to 60 inches; pale brown (10YR 6/3) fragmental material, brown (10YR 4/3) moist; few fine roots; 35 percent stones, 20 percent cobbles, and 40 percent pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to fragmental material:* 5 to 20 inches

#### E horizon

Hue: 7.5YR or 10YR

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

Chroma: 2 through 6

Clay content: 10 to 20 percent

Content of rock fragments: 60 to 90 percent—20 to 25 percent boulders; 20 to 35 percent stones; 20 to 30 percent cobbles

Reaction: pH 5.1 to 6.5

#### Bw horizon

Hue: 7.5YR or 10YR

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

Chroma: 2 through 6

Clay content: 10 to 12 percent

Content of rock fragments: 60 to 90 percent—20 to 30 percent stones; 15 to 25 percent cobbles; 25 to 35 percent pebbles

Reaction: pH 5.1 to 6.5

#### C horizon

Clay content: 10 to 12 percent

Content of rock fragments: 90 to 100 percent

Reaction: pH 5.1 to 6.5

## 695E—Arcette extremely bouldery sandy loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 6,250 to 7,900 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Arcette and similar soils: 90 percent

#### Minor Components

Rubble land: 0 to 8 percent

Stemple bouldery loam: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Extremely bouldery sandy loam

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

*Drainage class:* Excessively drained

*Dominant parent material:* Igneous colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.4 inches

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

### Management

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

### Attewan Series

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

*Drainage class:* Well drained

*Permeability:* Moderately slow above the 2C horizon and rapid in the 2C horizon

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,150 to 4,650 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

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

### Typical Pedon

Attewan clay loam, 0 to 4 percent slopes, in an area of pasture, 2,000 feet south and 2,500 feet west of the northeast corner of sec. 31, T. 1 N., R. 4 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; very hard, friable, nonsticky, and slightly plastic; many very fine and fine roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—6 to 12 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; very hard, friable, nonsticky, and slightly plastic; many very fine and fine roots; common distinct clay films on faces of pedis; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—12 to 16 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak medium subangular

blocky; hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk2**—16 to 22 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk3**—22 to 26 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 40 percent pebbles; few fine masses of lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

**2C**—26 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, and nonplastic; 10 percent cobbles and 50 percent pebbles; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to the Bk horizon:* 10 to 21 inches

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

#### *Ap horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

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

Reaction: pH 6.6 to 7.3

#### *Bt horizon*

Hue: 10YR or 2.5Y

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

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### *Bk1 and Bk2 horizons*

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, 4, or 6

Texture: Loam, clay loam, silt loam, sandy clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### *Bk3 horizon*

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, 4, or 6

Texture: Loam, clay loam, silt loam, sandy clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 35 to 60 percent—10 to 15 percent cobbles; 25 to 45 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### *2C horizon*

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

## **33B—Attewan clay loam, 0 to 4 percent slopes**

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,150 to 4,650 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Attewan and similar soils: 90 percent

#### Minor Components

Beaverell cobbly loam: 0 to 5 percent

Beavwan loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.5 inches

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

### Management

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

### Bacbuster Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Hills and escarpments

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 4 to 45 percent

*Elevation range:* 4,400 to 6,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Bacbuster clay loam, in an area of Bacbuster-Wilsall-Castner complex, 15 to 45 percent slopes, in an area of rangeland, 1,500 feet north and 1,000 feet east of the southwest corner of sec. 27, T. 5 N., R. 5 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine and few medium roots; slightly alkaline; clear smooth boundary.

Bt1—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and very plastic; common very fine and fine and few medium roots; common distinct clay films on faces of pedis and lining pores; 10 percent soft shale chips; slightly alkaline; clear smooth boundary.

Bt2—9 to 15 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and very plastic; few very fine and fine roots; common prominent clay films on

faces of pedis and lining pores; 20 percent soft shale chips; slightly alkaline; clear smooth boundary.

Btk—15 to 25 inches; gray (10YR 5/1) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of pedis and lining pores; 25 percent soft shale chips; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—25 to 36 inches; gray (10YR 5/1) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; 50 percent soft shale chips; many medium threads of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—36 to 60 inches; gray (10YR 5/1) semiconsolidated shale; few lime coatings on shale fragments.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

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

#### A horizon

Value: 4 or 5 dry

Chroma: 2 or 3

Texture: Clay loam or silty clay loam

Clay content: 27 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

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

Reaction: pH 6.6 to 7.8

#### Bt2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2, 3, or 4

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 25 percent soft shale chips

Reaction: pH 6.6 to 7.8

*Btk horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 1, 2, 3, or 4

Texture: Clay loam or silty clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 30 percent soft shale chips

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

*Bk horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry

Chroma: 1, 2, 3, or 4

Texture: Clay loam or silty clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 15 to 60 percent soft shale chips

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

**315D—Bacbuster-Cabba complex,  
4 to 15 percent slopes**

**Setting**

*Landform:*

- Bacbuster—Hills
- Cabba—Hills

*Slope:*

- Bacbuster—4 to 15 percent
- Cabba—4 to 15 percent

*Elevation:* 4,500 to 5,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Bacbuster and similar soils: 70 percent

Cabba and similar soils: 20 percent

**Minor Components**

Norbert silty clay loam: 0 to 5 percent

Castner channery loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

**Major Component Description**

**Bacbuster**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

**Cabba**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

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

**Management**

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

**260D—Bacbuster-Wilsall complex,  
4 to 15 percent slopes**

**Setting**

*Landform:*

- Bacbuster—Hills
- Wilsall—Hills

*Slope:*

- Bacbuster—4 to 15 percent
- Wilsall—4 to 15 percent

*Elevation:* 4,600 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Bacbuster and similar soils: 60 percent

Wilsall and similar soils: 30 percent

**Minor Components**

Castner very flaggy loam: 0 to 5 percent

Reedwest loam: 0 to 5 percent

### Major Component Description

#### Bacbuster

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

#### Wilsall

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.9 inches

A typical description with range in characteristics is 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—Bacbuster-Wilsall-Castner complex, 4 to 15 percent slopes

#### Setting

##### *Landform:*

- Bacbuster—Hills
- Wilsall—Hills
- Castner—Hills

##### *Slope:*

- Bacbuster—4 to 15 percent
- Wilsall—4 to 15 percent
- Castner—4 to 15 percent

*Elevation:* 4,400 to 6,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Bacbuster and similar soils: 60 percent

Wilsall and similar soils: 15 percent

Castner and similar soils: 15 percent

#### Minor Components

Work clay loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Bacbuster

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

#### Wilsall

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.9 inches

#### Castner

*Surface layer texture:* Very channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

A typical description with range in characteristics is 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—Bacbuster-Wilsall-Castner complex, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Bacbuster—Hills
- Wilsall—Hills
- Castner—Hills

##### *Slope:*

- Bacbuster—15 to 45 percent
- Wilsall—15 to 45 percent
- Castner—15 to 45 percent

*Elevation:* 4,500 to 6,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Bacbuster and similar soils: 50 percent  
 Wilsall and similar soils: 20 percent  
 Castner and similar soils: 20 percent

### Minor Components

Work clay loam: 0 to 8 percent  
 Rock outcrop: 0 to 2 percent

## Major Component Description

### Bacbuster

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

### Wilsall

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.9 inches

### Castner

*Surface layer texture:* Very channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

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

## Management

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

## Bandy Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Permeability:* Moderate to the 2C horizon and rapid in the 2C horizon

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,050 to 5,800 feet

*Annual precipitation:* 12 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

## Typical Pedon

Bandy loam, in an area of Bandy-Riverwash-Bonebasin complex, 0 to 2 percent slopes, in an area of woodland, 1,200 feet north and 2,600 feet east of the southwest corner of sec. 30, T. 3 S., R. 5 E.

A—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bw—8 to 17 inches; very dark brown (10YR 2/2) sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium and coarse roots, 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

2C—17 to 60 inches; dark brown (10YR 3/3) very cobbly loamy coarse sand, brown (10YR 4/3) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; single grain; loose, nonsticky, and nonplastic; few very fine roots; 20 percent cobbles and 30 percent pebbles; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 8 and 12 inches

*Mollic epipedon thickness:* 10 to 19 inches

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

*Depth to the 2C horizon:* 12 to 20 inches

### A horizon

Value: 3 or 4 dry; 2 or 3 moist

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 6.6 to 7.8

**Bw horizon**

Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 1 or 2  
 Texture: Sandy loam or loam  
 Clay content: 5 to 18 percent  
 Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles  
 Reaction: pH 6.6 to 7.8

**2C horizon**

Value: 4, 5, or 6 dry  
 Texture: Sand, loamy sand, or loamy coarse sand  
 Clay content: 2 to 10 percent  
 Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles; 30 to 50 percent pebbles  
 Reaction: pH 6.6 to 7.8

### **605A—Bandy-Bonebasin loams, 0 to 2 percent slopes**

#### **Setting**

**Landform:**

- Bandy—Flood plains
- Bonebasin—Flood plains

**Slope:**

- Bandy—0 to 2 percent
- Bonebasin—0 to 2 percent

**Elevation:** 4,050 to 4,400 feet

**Mean annual precipitation:** 12 to 16 inches

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

#### **Composition**

**Major Components**

Bandy and similar soils: 60 percent  
 Bonebasin and similar soils: 25 percent

**Minor Components**

Nesda cobbly loam: 0 to 8 percent  
 Sudworth loam: 0 to 5 percent  
 Water: 0 to 2 percent

#### **Major Component Description**

**Bandy**

**Surface layer texture:** Loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Poorly drained  
**Dominant parent material:** Alluvium  
**Native plant cover type:** Forest land  
**Flooding:** Occasional  
**Water table:** Apparent  
**Available water capacity:** Mainly 3.1 inches

**Bonebasin**

**Surface layer texture:** Loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Very poorly drained  
**Dominant parent material:** Alluvium  
**Native plant cover type:** Rangeland  
**Flooding:** Occasional  
**Water table:** Apparent  
**Available water capacity:** Mainly 6.0 inches

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

#### **Management**

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

### **606A—Bandy-Riverwash-Bonebasin complex, 0 to 2 percent slopes**

#### **Setting**

**Landform:**

- Bandy—Flood plains
- Riverwash—Flood plains
- Bonebasin—Flood plains

**Slope:**

- Bandy—0 to 2 percent
- Bonebasin—0 to 2 percent

**Elevation:** 4,200 to 5,800 feet

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

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

#### **Composition**

**Major Components**

Bandy and similar soils: 50 percent  
 Riverwash: 25 percent  
 Bonebasin and similar soils: 10 percent

**Minor Components**

Blossberg loam: 0 to 5 percent  
 Nesda cobbly loam: 0 to 5 percent  
 Water: 0 to 5 percent

#### **Major Component Description**

**Bandy**

**Surface layer texture:** Loam  
**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Poorly drained  
**Dominant parent material:** Alluvium  
**Native plant cover type:** Forest land  
**Flooding:** Occasional  
**Water table:** Apparent  
**Available water capacity:** Mainly 3.1 inches

**Riverwash**

*Definition:* Unstable areas of sandy, gravelly, or cobbly sediments; frequently flooded; and supporting little or no vegetation.

*Dominant parent material:* Alluvium

*Flooding:* Frequent

**Bonebasin**

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

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

**Management**

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

**Bangtail Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Hills, mountains, and escarpments

*Parent material:* Interbedded sandstone and shale residuum or semiconsolidated, clayey sedimentary beds

*Slope range:* 4 to 60 percent

*Elevation range:* 4,800 to 8,000 feet

*Annual precipitation:* 17 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

**Typical Pedon**

Bangtail loam, in an area of Bangtail-Copenhaver complex, 8 to 25 percent slopes, in an area of rangeland, 2,100 feet north and 1,200 feet west of the southeast corner of sec. 24, T. 2 S., R. 7 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; many very fine, common fine, and few medium pores; 5 percent channers,

10 percent soft shale chips; slightly acid; clear smooth boundary.

Bt1—9 to 14 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; many very fine and few fine and medium pores; few faint clay films on faces of peds; 5 percent channers, 10 percent soft shale chips; slightly acid; clear smooth boundary.

Bt2—14 to 23 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; common distinct clay films on faces of peds; 5 percent channers, 15 percent soft shale chips; slightly acid; clear wavy boundary.

C—23 to 37 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; 5 percent channers, 20 percent soft shale chips; neutral; gradual wavy boundary.

Cr—37 to 60 inches; olive yellow (2.5Y 6/6) interbedded soft shale and fine grained sandstone; neutral.

**Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

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

**A horizon**

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Clay loam or loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 30 percent—0 to 5 percent stones; 0 to 5 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips

Reaction: pH 5.6 to 7.3

**Bt1 horizon**

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips  
 Reaction: pH 5.6 to 7.3

#### *Bt2 horizon*

Hue: 10YR or 2.5Y  
 Value: 4, 5, or 6 dry; 3, 4, or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Clay loam or clay  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips  
 Reaction: pH 6.1 to 7.3

#### *C horizon*

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 3, 4, or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Clay loam or clay  
 Clay content: 27 to 45 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 25 percent soft shale chips  
 Reaction: pH 6.1 to 7.3

### **479F—Bangtail clay loam, 35 to 60 percent slopes**

#### **Setting**

*Landform:* Hills  
*Slope:* 35 to 60 percent  
*Elevation:* 4,900 to 6,900 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Bangtail and similar soils: 85 percent

##### **Minor Components**

Copenhaver flaggy loam: 0 to 8 percent  
 Timberlin stony loam: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

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

#### **Management**

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

### **679D—Bangtail-Adel loams, 4 to 25 percent slopes**

#### **Setting**

*Landform:*

- Bangtail—Hills
- Adel—Hills

*Slope:*

- Bangtail—4 to 25 percent
- Adel—4 to 25 percent

*Elevation:* 5,250 to 6,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Bangtail and similar soils: 45 percent

Adel and similar soils: 40 percent

##### **Minor Components**

Copenhaver flaggy loam: 0 to 5 percent

Doby clay loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

#### **Major Component Description**

##### **Bangtail**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

##### **Adel**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.3 inches

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

### Management

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

## 579E—Bangtail-Adel, cool, loams, 8 to 25 percent slopes

### Setting

*Landform:*

- Bangtail—Hills
- Adel—Hills

*Slope:*

- Bangtail—8 to 25 percent
- Adel—8 to 25 percent

*Elevation:* 5,700 to 6,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bangtail and similar soils: 60 percent

Adel and similar soils: 25 percent

#### Minor Components

Libeg stony loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Redlodge silty clay loam: 0 to 2 percent

### Major Component Description

#### Bangtail

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

#### Adel

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

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

### Management

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

## 479E—Bangtail-Bridger complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Bangtail—Hills
- Bridger—Drainageways

*Slope:*

- Bangtail—15 to 45 percent
- Bridger—15 to 45 percent

*Elevation:* 5,000 to 6,500 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bangtail and similar soils: 60 percent

Bridger and similar soils: 30 percent

#### Minor Components

Timberlin stony loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 4 percent

Redlodge silty clay loam: 0 to 1 percent

### Major Component Description

#### Bangtail

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

#### Bridger

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

### Management

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

#### 679F—Bangtail-Copenhaver complex, 35 to 60 percent slopes

##### Setting

###### Landform:

- Bangtail—Hills
- Copenhaver—Hills

###### Slope:

- Bangtail—35 to 60 percent
- Copenhaver—35 to 60 percent

*Elevation:* 5,300 to 8,000 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

##### Composition

###### Major Components

Bangtail and similar soils: 70 percent

Copenhaver and similar soils: 20 percent

###### Minor Components

Redchief stony loam: 0 to 6 percent

Rock outcrop: 0 to 4 percent

##### Major Component Description

###### Bangtail

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

###### Copenhaver

*Surface layer texture:* Flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

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

### Management

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

#### 679E—Bangtail-Copenhaver complex, 8 to 25 percent slopes

##### Setting

###### Landform:

- Bangtail—Hills
- Copenhaver—Hills

###### Slope:

- Bangtail—8 to 25 percent
- Copenhaver—8 to 25 percent

*Elevation:* 6,100 to 7,800 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

##### Composition

###### Major Components

Bangtail and similar soils: 60 percent

Copenhaver and similar soils: 25 percent

###### Minor Components

Redchief stony loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

##### Major Component Description

###### Bangtail

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

###### Copenhaver

*Surface layer texture:* Flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

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

### Management

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

## 879E—Bangtail-Copenhaver-Adel complex, 15 to 35 percent slopes

### Setting

*Landform:*

- Bangtail—Hills
- Copenhaver—Hills
- Adel—Hills

*Slope:*

- Bangtail—15 to 35 percent
- Copenhaver—15 to 35 percent
- Adel—15 to 35 percent

*Elevation:* 5,400 to 7,200 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bangtail and similar soils: 40 percent

Copenhaver and similar soils: 30 percent

Adel and similar soils: 20 percent

#### Minor Components

Doby clay loam: 0 to 6 percent

Redlodge silty clay loam: 0 to 2 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Bangtail

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

#### Copenhaver

*Surface layer texture:* Flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

#### Adel

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.3 inches

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

### Management

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

## 979E—Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes

### Setting

*Landform:*

- Bangtail—Hills
- Doby—Hills
- Redlodge—Drainageways

*Slope:*

- Bangtail—15 to 45 percent
- Doby—15 to 45 percent
- Redlodge—4 to 6 percent

*Elevation:* 5,900 to 6,600 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bangtail and similar soils: 40 percent

Doby and similar soils: 35 percent

Redlodge and similar soils: 15 percent

#### Minor Components

Adel loam: 0 to 5 percent

Copenhaver flaggy loam: 0 to 5 percent

### Major Component Description

#### Bangtail

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

#### Doby

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

#### Redlodge

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 10.8 inches

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

### Management

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

### 693F—Bangtail-Timberlin complex, 35 to 60 percent slopes, stony

### Setting

#### *Landform:*

- Bangtail—Mountains
- Timberlin—Mountains

#### *Slope:*

- Bangtail—35 to 60 percent
- Timberlin—35 to 60 percent

*Elevation:* 4,800 to 7,500 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bangtail and similar soils: 60 percent  
 Timberlin and similar soils: 30 percent

#### Minor Components

Copenhaver flaggy loam: 0 to 8 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Bangtail

*Surface layer texture:* Gravelly loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

#### Timberlin

*Surface layer texture:* Flaggy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

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

### Management

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

### 494F—Bangtail-Timberlin complex, moist, 35 to 60 percent slopes, stony

### Setting

#### *Landform:*

- Bangtail—Mountains
- Timberlin—Mountains

#### *Slope:*

- Bangtail—35 to 60 percent
- Timberlin—35 to 60 percent

*Elevation:* 5,000 to 7,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Bangtail and similar soils: 45 percent  
Timberlin and similar soils: 40 percent

### Minor Components

Yellowmule loam: 0 to 8 percent  
Cowood channery sandy loam: 0 to 5 percent  
Rock outcrop: 0 to 2 percent

## Major Component Description

### Bangtail

*Surface layer texture:* Gravelly loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

### Timberlin

*Surface layer texture:* Flaggy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

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

## Management

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

### 693E—Bangtail-Timberlin, stony complex, 15 to 45 percent slopes

## Setting

#### *Landform:*

- Bangtail—Mountains
- Timberlin—Mountains

#### *Slope:*

- Bangtail—15 to 45 percent
- Timberlin—15 to 45 percent

*Elevation:* 5,000 to 7,200 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Bangtail and similar soils: 60 percent  
Timberlin and similar soils: 30 percent

### Minor Components

Copenhaver flaggy loam: 0 to 5 percent  
Adel loam: 0 to 4 percent  
Rock outcrop: 0 to 1 percent

## Major Component Description

### Bangtail

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

### Timberlin

*Surface layer texture:* Flaggy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

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

## Management

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

### 494E—Bangtail-Timberlin, stony complex, moist 15 to 45 percent slopes

## Setting

#### *Landform:*

- Bangtail—Mountains
- Timberlin—Mountains

#### *Slope:*

- Bangtail—15 to 45 percent
- Timberlin—15 to 45 percent

*Elevation:* 5,050 to 7,200 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Bangtail and similar soils: 50 percent  
 Timberlin and similar soils: 40 percent

### Minor Components

Yellowmule loam: 0 to 5 percent  
 Cowood channery sandy loam: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

## Major Component Description

### Bangtail

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

### Timberlin

*Surface layer texture:* Flaggy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

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

## Management

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

### Barbarela Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Hills  
*Parent material:* Colluvium or gneiss or schist residuum  
*Slope range:* 4 to 45 percent  
*Elevation range:* 5,000 to 7,300 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

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

## Typical Pedon

Barbarela coarse sandy loam, in an area of Barbarela-Poin, stony-Bavdark complex, 15 to 45 percent slopes, in an area of rangeland, 1,100 feet south and 2,300 feet west of the northeast corner of sec. 25, T. 3 S., R. 3 E.

A—0 to 11 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine, common fine, and few medium roots; 10 percent pebbles; neutral; clear wavy boundary.

AB—11 to 15 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent pebbles; neutral; clear wavy boundary.

Bt—15 to 37 inches; yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Cr—37 to 52 inches; highly weathered, decomposed gneiss bedrock that crushes to a very gravelly coarse sand.

R—52 inches; hard gneiss bedrock.

## Range in Characteristics

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 8 to 16 inches  
*Depth to the Cr horizon:* 20 to 40 inches  
*Depth to the R horizon:* 40 to 60 inches

### A horizon

Value: 3 or 4 dry; 2 or 3 moist  
 Chroma: 1 or 2  
 Clay content: 12 to 20 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

### AB horizon

Value: 3 or 4 dry; 2 or 3 moist  
 Clay content: 12 to 20 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

**Bt horizon**

Value: 3 or 4 moist  
 Chroma: 3, 4, 5, or 6  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 10 to 30 percent—0 to  
 5 percent cobbles; 5 to 25 percent pebbles  
 Reaction: pH 6.1 to 7.3

## 782E—Barbarela-Poin, stony-Bavdark complex, 15 to 45 percent slopes

### Setting

**Landform:**

- Barbarela—Hills
- Poin—Hills
- Bavdark—Hills

**Slope:**

- Barbarela—15 to 45 percent
- Poin—15 to 45 percent
- Bavdark—15 to 45 percent

**Elevation:** 5,000 to 7,300 feet

**Mean annual precipitation:** 20 to 24 inches

**Frost-free period:** 50 to 70 days

### Composition

**Major Components**

Barbarela and similar soils: 50 percent

Poin and similar soils: 25 percent

Bavdark and similar soils: 15 percent

**Minor Components**

Rock outcrop: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

### Major Component Description

**Barbarela**

**Surface layer texture:** Coarse sandy loam

**Depth class:** Moderately deep (20 to 40 inches)

**Drainage class:** Well drained

**Dominant parent material:** Gneiss or schist residuum

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 5.3 inches

**Poin**

**Surface layer texture:** Very cobbly coarse sandy loam

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

**Drainage class:** Well drained

**Dominant parent material:** Gneiss or schist residuum

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 1.2 inches

**Bavdark**

**Surface layer texture:** Coarse sandy loam

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

**Drainage class:** Well drained

**Dominant parent material:** Alluvium or colluvium

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 7.8 inches

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

### Management

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

## 782D—Barbarela-Poin, stony-Bavdark complex, 4 to 15 percent slopes

### Setting

**Landform:**

- Barbarela—Hills
- Poin—Hills
- Bavdark—Hills

**Slope:**

- Barbarela—4 to 15 percent
- Poin—4 to 15 percent
- Bavdark—4 to 15 percent

**Elevation:** 5,950 to 7,300 feet

**Mean annual precipitation:** 20 to 24 inches

**Frost-free period:** 50 to 70 days

### Composition

**Major Components**

Barbarela and similar soils: 50 percent

Poin and similar soils: 25 percent

Bavdark and similar soils: 20 percent

**Minor Components**

Rock outcrop: 0 to 5 percent

### Major Component Description

**Barbarela**

**Surface layer texture:** Coarse sandy loam

**Depth class:** Moderately deep (20 to 40 inches)

**Drainage class:** Well drained

**Dominant parent material:** Gneiss or schist residuum

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 5.3 inches

**Poin**

**Surface layer texture:** Very cobbly coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.2 inches

### **Bavdark**

*Surface layer texture:* Coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

## **Management**

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

### ***Bavdark Series***

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills, drainageways, alluvial fans, and stream terraces

*Parent material:* Alluvium or colluvium

*Slope range:* 4 to 50 percent

*Elevation range:* 5,000 to 7,300 feet

*Annual precipitation:* 17 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

### **Typical Pedon**

Bavdark coarse sandy loam, in an area of Barbarella-Poin, stony-Bavdark complex, 4 to 15 percent slopes, in an area of rangeland, 900 feet north and 2,300 feet west of the southeast corner of sec. 33, T. 3 S., R. 3 E.

A—0 to 10 inches; dark gray (10YR 4/1) coarse sandy loam, black (10YR 2/1) moist; weak medium granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine and medium pores; 5 percent pebbles; slightly acid; clear smooth boundary.

AB—10 to 18 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; many very fine, common fine, and few medium pores; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—18 to 30 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, very friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; many very fine, common fine, and few medium pores; common faint clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

Bt2—30 to 42 inches; brown (10YR 5/3) sandy clay loam, very dark grayish brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, very friable, moderately sticky, and slightly plastic; few very fine, fine, and medium roots; many very fine, common fine, and few medium pores; common faint clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

C—42 to 60 inches; brown (10YR 5/3) coarse sandy loam; brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine and fine roots; many very fine, common fine, and few medium pores; 10 percent pebbles; slightly acid.

### **Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 18 to 45 inches

#### *A horizon*

Value: 3 or 4 dry; 2 or 3 moist

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 12 to 25 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 6.1 to 7.3

#### *AB horizon*

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Coarse sandy loam or sandy clay loam

Clay content: 12 to 25 percent

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

Reaction: pH 6.1 to 7.3

**Bt1 horizon**

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy clay loam or clay loam  
 Clay content: 22 to 35 percent  
 Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles  
 Reaction: pH 6.1 to 7.3

**Bt2 horizon**

Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 3 or 4  
 Texture: Sandy clay loam or clay loam  
 Clay content: 22 to 35 percent  
 Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles  
 Reaction: pH 6.1 to 7.3

**C horizon**

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 3 or 4  
 Texture: Sandy clay loam or coarse sandy loam  
 Clay content: 12 to 25 percent  
 Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles  
 Reaction: pH 6.1 to 7.3

**182E—Bavdark gravelly coarse sandy loam, 8 to 25 percent slopes, stony****Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 25 percent  
*Elevation:* 5,850 to 6,350 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition****Major Components**

Bavdark and similar soils: 90 percent

**Minor Components**

Bavdark loam: 0 to 5 percent  
 Libeg very stony loam: 0 to 3 percent  
 Soils with slopes more than 25 percent: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Gravelly coarse 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 7.2 inches

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

**Management**

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

**282E—Bavdark loam, 8 to 25 percent slopes****Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 25 percent  
*Elevation:* 5,200 to 5,550 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition****Major Components**

Bavdark and similar soils: 90 percent

**Minor Components**

Bridger loam: 0 to 5 percent  
 Soils with slopes more than 25 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.3 inches

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

**Management**

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

**382E—Bavdark sandy loam, moist, 8 to 35 percent slopes****Setting**

*Landform:* Drainageways  
*Slope:* 8 to 35 percent  
*Elevation:* 5,200 to 6,250 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Bavdark and similar soils: 90 percent

### Minor Components

Shadow stony coarse sandy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 3 percent

Mooseflat loam: 0 to 2 percent

## Major Component Description

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

## Management

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

## 582E—Bavdark, moist-Bavdark-Mooseflat loams, 4 to 25 percent slopes

### Setting

*Landform:*

- Bavdark—Drainageways
- Bavdark—Drainageways
- Mooseflat—Drainageways

*Slope:*

- Bavdark—4 to 25 percent
- Bavdark—4 to 25 percent
- Mooseflat—4 to 8 percent

*Elevation:* 5,400 to 6,600 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Bavdark and similar soils: 40 percent

Bavdark and similar soils: 30 percent

Mooseflat and similar soils: 15 percent

### Minor Components

Libeg stony loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Soils with a water table at 1.5 to 4 feet: 0 to 5 percent

## Major Component Description

### Bavdark, moist

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

### Bavdark

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

### Mooseflat

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 4.6 inches

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

## Management

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

## Beanlake Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans, relict stream terraces, stream terraces, and escarpments

*Parent material:* Alluvium

*Slope range:* 0 to 45 percent

*Elevation range:* 4,300 to 6,550 feet

*Annual precipitation:* 12 to 19 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Beanlake gravelly loam, 8 to 15 percent slopes, in an area of rangeland, 1,500 feet south and 1,400 feet east of the northwest corner of sec. 10, T. 2 S., R. 3 E.

A—0 to 6 inches; grayish brown (10YR 5/2) gravelly loam; very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; 5 percent cobbles and 15 percent pebbles; many very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—6 to 13 inches; light gray (10YR 7/2) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, moderately sticky, and slightly plastic; common very fine and fine roots; 5 percent pebbles; common fine masses and seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—13 to 26 inches; light gray (10YR 7/2) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 10 percent pebbles; common fine masses and seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—26 to 60 inches; light gray (10YR 7/2) gravelly loam; light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; 5 percent cobbles and 20 percent pebbles; few very fine and fine roots; common fine masses and seams of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 8 inches

*Depth to the Bk horizon:* 5 to 8 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or silt loam

Clay content: 18 to 25 percent

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

Reaction: pH 7.9 to 8.4

#### Bk horizons

Value: 5, 6, 7, or 8 dry; 3, 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 18 to 25 percent

Content of rock fragments: 5 to 35 percent—0 to

15 percent cobbles; 5 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

### 363E—Beanlake cobbly loam, 15 to 35 percent slopes, stony

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 15 to 35 percent

*Elevation:* 4,600 to 6,350 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Beanlake and similar soils: 90 percent

##### Minor Components

Soils with slopes more than 35 percent: 0 to 5 percent

Windham bouldery loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

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

#### Management

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

### 363D—Beanlake cobbly loam, 8 to 15 percent slopes, stony

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,650 to 6,550 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Beanlake and similar soils: 85 percent

#### Minor Components

Beanlake gravelly loam: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent  
 Windham bouldery loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.3 inches

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

### Management

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

## 163C—Beanlake gravelly loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,350 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Beanlake and similar soils: 85 percent

#### Minor Components

Beanlake cobbly loam: 0 to 10 percent  
 Windham very cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

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

### Management

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

## 163D—Beanlake gravelly loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,450 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Beanlake and similar soils: 85 percent

#### Minor Components

Windham stony loam: 0 to 8 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent  
 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

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

### Management

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

## 63B—Beanlake loam, 0 to 4 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 4,300 to 5,850 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Beanlake and similar soils: 85 percent

### Minor Components

Beanlake gravelly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Windham cobbly 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

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

## Management

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

### 463B—Beanlake silt loam, moderately wet, 1 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 1 to 4 percent

*Elevation:* 4,300 to 5,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Beanlake and similar soils: 85 percent

##### Minor Components

Beanlake cobbly loam: 0 to 8 percent

Fairway loam: 0 to 5 percent

Trimad cobbly 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 8.4 inches

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

## Management

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

### 663B—Beanlake-Corbly complex, 0 to 4 percent slopes

#### Setting

*Landform:*

- Beanlake—Alluvial fans and stream terraces
- Corbly—Alluvial fans and stream terraces

*Slope:*

- Beanlake—0 to 4 percent
- Corbly—0 to 4 percent

*Elevation:* 4,300 to 4,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Beanlake and similar soils: 60 percent

Corbly and similar soils: 30 percent

##### Minor Components

Corbly very cobbly loam: 0 to 5 percent

Quigley loam: 0 to 5 percent

#### Major Component Description

##### Beanlake

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

##### Corbly

*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 2.7 inches

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

## Management

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

### **Beaverell Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate above the sandy-skeletal material and rapid in the sandy-skeletal material  
*Landform:* Stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 4,100 to 5,000 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

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

### Typical Pedon

Beaverell cobbly loam, 0 to 2 percent slopes, in an area of cropland, 100 feet north and 150 feet west of the southeast corner of sec. 33, T. 1 N., R. 4 E.

Ap—0 to 7 inches; brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—7 to 13 inches; dark grayish brown (10YR 4/2) very cobbly clay loam, dark brown (10YR 4/3) moist; strong medium angular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and common fine roots; common distinct clay films on faces of peds and lining pores; 25 percent cobbles and 20 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 20 inches; dark grayish brown (10YR 4/2) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; few faint clay films on faces of peds and lining pores; 35 percent cobbles and 30 percent pebbles; neutral; gradual wavy boundary.

2Bk1—20 to 24 inches; dark grayish brown (10YR 4/2) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky

structure; soft, loose, nonsticky, and nonplastic; common very fine and few fine roots; 35 percent cobbles and 35 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

2Bk2—24 to 60 inches; variegated extremely cobbly loamy coarse sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky, and nonplastic; few very fine roots; 50 percent cobbles and 35 percent pebbles; few fine masses of lime; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 11 inches  
*Depth to the Bk horizon:* 10 to 20 inches

#### *Ap horizon*

Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### *Bt horizons*

Value: 3, 4, or 5 dry; 2, 3, or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy clay loam, clay loam, or loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 35 to 60 percent—10 to 35 percent cobbles; 25 to 35 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### *2Bk1 horizon*

Value: 4, 5, or 6 dry; 4 or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Coarse sandy loam or sandy loam  
 Clay content: 10 to 15 percent  
 Content of rock fragments: 35 to 75 percent—10 to 35 percent cobbles; 25 to 40 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

#### *2Bk2 horizon*

Value: 4, 5, or 6 dry; 3, 4, or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Loamy sand, loamy coarse sand, sand, or coarse sand  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 40 to 75 percent—15 to 50 percent cobbles; 25 to 55 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

**241A—Beaverell cobbly loam,  
0 to 2 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Elevation:* 4,250 to 4,650 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Beaverell and similar soils: 85 percent

**Minor Components**

Attewan loam: 0 to 5 percent  
 Beaverell very cobbly loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.2 inches

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

**Management**

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

**41A—Beaverell loam,  
0 to 2 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Elevation:* 4,200 to 4,650 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Beaverell and similar soils: 90 percent

**Minor Components**

Attewan loam: 0 to 5 percent  
 Beaverell cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.4 inches

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

**Management**

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

**741A—Beaverell-Beavwan complex,  
0 to 2 percent slopes****Setting**

*Landform:*

- Beaverell—Stream terraces
- Beavwan—Stream terraces

*Slope:*

- Beaverell—0 to 2 percent
- Beavwan—0 to 2 percent

*Elevation:* 4,100 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Beaverell and similar soils: 55 percent  
 Beavwan and similar soils: 30 percent

**Minor Components**

Attewan clay loam: 0 to 5 percent  
 Beaverell very cobbly clay loam: 0 to 5 percent  
 Channeled areas: 0 to 5 percent

**Major Component Description****Beaverell**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.2 inches

**Beavwan**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

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

### Management

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

## 341A—Beaverell-Beavwan loams, moderately wet, 0 to 2 percent slopes

### Setting

*Landform:*

- Beaverell—Stream terraces
- Beavwan—Stream terraces

*Slope:*

- Beaverell—0 to 2 percent
- Beavwan—0 to 2 percent

*Elevation:* 4,100 to 4,750 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Beaverell and similar soils: 60 percent

Beavwan and similar soils: 30 percent

#### Minor Components

Beaverell cobbly loam: 0 to 5 percent

Attewan loam: 0 to 3 percent

Channeled areas: 0 to 2 percent

### Major Component Description

#### Beaverell

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 3.4 inches

#### Beavwan

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 4.0 inches

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

### Management

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

## Beaverton Series

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

*Drainage class:* Well drained

*Permeability:* Moderate above the 2C horizon and rapid in the 2C horizon

*Landform:* Stream terraces and alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 6 percent

*Elevation range:* 4,350 to 6,150 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Beaverton cobbly loam, 0 to 4 percent slopes, in an area of pasture, 1,300 feet south and 1,200 feet west of the northeast corner of sec. 14, T. 1 N., R. 5 E.

A—0 to 5 inches; brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 11 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 15 percent cobbles and 40 percent pebbles; neutral; clear smooth boundary.

Bt2—11 to 21 inches; brown (10YR 5/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots;

25 percent cobbles and 35 percent pebbles; neutral; clear smooth boundary.

**Bk1**—21 to 25 inches; variegated very cobbly coarse sandy loam; weak fine subangular blocky structure; loose, nonsticky, and nonplastic; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**2Bk2**—25 to 60 inches; variegated extremely cobbly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; few very fine roots; 35 percent cobbles and 40 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 7 to 14 inches

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

#### A horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 5 to 25 percent—0 to 15 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizons

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Texture: Sandy loam or coarse sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 35 to 80 percent—0 to 35 percent cobbles; 15 to 60 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### 2Bk2 horizon

Texture: Loamy sand, sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 35 percent cobbles; 15 to 65 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 249A—Beaverton cobbly clay loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,450 to 5,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Beaverton and similar soils: 90 percent

#### Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Turner loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.0 inches

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

### Management

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

## 149B—Beaverton cobbly loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,400 to 5,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Beaverton and similar soils: 90 percent

#### Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Hyalite loam: 0 to 3 percent

Corbly very cobbly loam: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.6 inches

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

### Management

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

### 349C—Beaverton very cobbly loam, 2 to 6 percent slopes, very stony

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 6 percent  
*Elevation:* 4,850 to 5,900 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Beaverton and similar soils: 90 percent

##### Minor Components

Turner stony loam: 0 to 6 percent  
 Soils with slopes more than 6 percent: 0 to 4 percent

### Major Component Description

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

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

### Management

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

### Beavwan Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow above the 2Bk horizon and rapid in the 2Bk horizon  
*Landform:* Stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 4,100 to 5,000 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

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

### Typical Pedon

Beavwan loam, in an area of Beaverell-Beavwan complex, 0 to 2 percent slopes, in an area of pasture, 2,400 feet south and 100 feet west of the northeast corner of sec. 35, T. 1 N., R. 4 E.

- A—0 to 5 inches; dark grayish brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.
- Bt1—5 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots; common faint clay films on faces of peds; 5 percent pebbles; neutral; clear wavy boundary.
- Bt2—7 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common faint clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear wavy boundary.
- 2Bt3—15 to 22 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few

medium roots; few faint clay films bridging sand grains; 25 percent cobbles and 30 percent pebbles; lime occurs on undersides of rock fragments; slightly alkaline; gradual wavy boundary.

**2Bk1**—22 to 28 inches; pale brown (10YR 6/3) extremely cobbly sandy loam; grayish brown (10YR 5/2) moist; weak fine granular structure; soft, loose, nonsticky, and nonplastic; few very fine and fine roots; 25 percent cobbles and 40 percent pebbles; common distinct lime coatings on rock fragments, disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

**2Bk2**—28 to 60 inches; variegated extremely cobbly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; 30 percent cobbles and 50 percent pebbles; common distinct lime coats on undersides of coarse fragments; violently effervescent, moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to sandy-skeletal material:* 14 to 35 inches

#### A horizon

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

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

Reaction: pH 6.6 to 7.3

#### Bt horizons

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

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### 2Bt3 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 75 percent—15 to 40 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 7.4 to 8.4

#### 2Bk1 horizon

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

Chroma: 2, 3, or 4

Clay content: 10 to 18 percent

Content of rock fragments: 40 to 80 percent—15 to 40 percent cobbles; 25 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

#### 2Bk2 horizon

Texture: Sand, loamy sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

## 43A—Beavwan loam, 0 to 2 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,350 to 4,650 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Beavwan and similar soils: 85 percent

#### Minor Components

Beaverell cobbly loam: 0 to 10 percent

Attewan 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

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

### Management

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

### 443A—Beavwan loam, moderately wet, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,450 to 4,700 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Beavwan and similar soils: 85 percent

##### Minor Components

Beaverell cobbly loam: 0 to 10 percent

Attewan clay 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 4.0 inches

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

#### Management

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

#### Beehive Series

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

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately rapid

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Elevation range:* 5,300 to 6,650 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Sandy-skeletal, mixed Oxyaquic Cryofluvents

#### Typical Pedon

Beehive gravelly sandy loam, in an area of Beehive-Mooseflat complex, 4 to 8 percent slopes, in an area of forest land, 2,600 feet north and 400 feet west of the southeast corner of sec. 34, T. 6 S., R. 3 E.

Oi—0 to 2 inches; slightly decomposed forest litter consisting of bark, needles, and twigs.

A—2 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few coarse roots; 10 percent cobbles and 20 percent pebbles; slightly acid; clear smooth boundary.

C1—5 to 20 inches; variegated extremely gravelly loamy coarse sand; massive; loose, nonsticky, and nonplastic; common very fine and few medium and coarse roots; 20 percent cobbles and 50 percent pebbles; slightly acid; clear wavy boundary.

C2—20 to 28 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 15 percent cobbles and 35 percent pebbles; slightly acid; clear wavy boundary.

C3—28 to 60 inches; variegated extremely cobbly loamy sand; massive; loose, nonsticky, and nonplastic; few very fine and medium roots; 40 percent cobbles and 35 percent pebbles; neutral.

#### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 12 and 35 inches

*Depth to seasonal high water table:* 24 to 42 inches

##### A horizon

Value: 3 or 4 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 6.1 to 7.8

##### C1 and C2 horizons

Hue: 10YR or variegated

Value: 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loamy coarse sand, loamy sand, or sandy loam

Clay content: 5 to 20 percent

Content of rock fragments: 40 to 70 percent—10 to 20 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 6.1 to 7.8

#### *C3 horizon*

Hue: 10YR or variegated

Value: 3 or 4 moist; 5 dry

Chroma: 2, 3, or 4

Texture: Loamy coarse sand, loamy sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 50 to 80 percent—30 to 40 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

### **608B—Beehive-Mooseflat complex, 0 to 4 percent slopes**

#### **Setting**

##### *Landform:*

- Beehive—Flood plains
- Mooseflat—Flood plains

##### *Slope:*

- Beehive—0 to 4 percent
- Mooseflat—0 to 4 percent

*Elevation:* 5,300 to 6,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Beehive and similar soils: 60 percent

Mooseflat and similar soils: 30 percent

##### **Minor Components**

Soils with a water table at 4 to 6 feet: 0 to 8 percent

Water: 0 to 2 percent

#### **Major Component Description**

##### **Beehive**

*Surface layer texture:* Gravelly sandy loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 2.2 inches

##### **Mooseflat**

*Surface layer texture:* Silty clay loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 4.6 inches

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

#### **Management**

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

### **608D—Beehive-Mooseflat complex, 4 to 8 percent slopes**

#### **Setting**

##### *Landform:*

- Beehive—Flood plains
- Mooseflat—Flood plains

##### *Slope:*

- Beehive—4 to 8 percent
- Mooseflat—4 to 8 percent

*Elevation:* 5,300 to 6,600 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Beehive and similar soils: 60 percent

Mooseflat and similar soils: 30 percent

##### **Minor Components**

Soils with a water table at 4 to 6 feet: 0 to 8 percent

Water: 0 to 2 percent

#### **Major Component Description**

##### **Beehive**

*Surface layer texture:* Gravelly sandy loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 2.2 inches

**Mooseflat**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Occasional  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.6 inches

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

**Management**

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

**Beenom Series**

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Hills  
*Parent material:* Argillite or igneous residuum  
*Slope range:* 4 to 60 percent  
*Elevation range:* 4,400 to 6,500 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy, mixed, superactive, frigid  
 Aridic Lithic Argiustolls

**Typical Pedon**

Beenom loam, 4 to 15 percent slopes, in an area of forest land, 200 feet south and 2,800 feet east of the northwest corner of sec. 19, T. 5 N., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; common very fine and fine pores; 5 percent cobbles and 5 percent channers; slightly acid; clear smooth boundary.

Bt1—6 to 11 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; common very fine and fine pores; many distinct clay films on faces of peds; 5 percent cobbles and 5 percent channers; slightly acid; clear smooth boundary.

Bt2—11 to 15 inches; brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common very fine and fine pores; many distinct clay films on faces of peds; 5 percent cobbles and 10 percent channers; slightly acid; clear smooth boundary.

BC—15 to 18 inches; reddish brown (2.5YR 4/4) very cobbly clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium prismatic structure; soft, friable, moderately sticky, and moderately plastic; few fine roots; many very fine and fine pores; 20 percent cobbles and 15 percent channers; moderately acid; abrupt smooth boundary.

R—18 inches; argillite bedrock.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

*Depth to bedrock:* 10 to 20 inches

**A horizon**

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

**Bt horizons**

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles or channers

Reaction: pH 6.1 to 7.3

**BC horizon**

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

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 30 to 60 percent—15 to 30 percent cobbles; 15 to 30 percent pebbles or channers

Reaction: pH 5.6 to 6.5

*Note:* Some pedons may lack a BC horizon.

**988F—Beenom, stony, moist-  
Rock outcrop complex,  
35 to 60 percent slopes**

**Setting**

*Landform:*

- Beenom—Hills
- Rock outcrop—Hills

*Slope:* 35 to 60 percent

*Elevation:* 4,400 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Beenom and similar soils: 70 percent

Rock outcrop: 20 percent

**Minor Components**

Absarook loam: 0 to 5 percent

Tolbert stony loam: 0 to 3 percent

Cabba loam: 0 to 2 percent

**Major Component Description**

**Beenom**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

**Rock outcrop**

*Definition:* Exposures of igneous bedrock.

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

**Management**

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

**970D—Beenom loam,  
4 to 15 percent slopes**

**Setting**

*Landform:* Hills

*Slope:* 4 to 15 percent

*Elevation:* 5,700 to 6,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Beenom and similar soils: 90 percent

**Minor Components**

Absarook loam: 0 to 5 percent

Tolbert channery loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

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

**Management**

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

**970F—Beenom, stony-Rock outcrop  
complex, 15 to 60 percent slopes**

**Setting**

*Landform:*

- Beenom—Hills
- Rock outcrop—Hills

*Slope:* 15 to 60 percent

*Elevation:* 4,600 to 6,300 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Beenom and similar soils: 50 percent

Rock outcrop: 40 percent

**Minor Components**

Absarook sandy loam: 0 to 5 percent

Anceney cobbly loam: 0 to 5 percent

**Major Component Description**

**Beenom**

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Igneous residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

**Rock outcrop**

*Definition:* Exposures of igneous bedrock.

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

**Management**

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

**Bielenberg Series**

*Depth class:* Deep

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and bedrock-floored plains

*Parent material:* Gneiss or schist residuum

*Slope range:* 4 to 45 percent

*Elevation range:* 4,400 to 6,650 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

**Typical Pedon**

Bielenberg sandy clay loam, in an area of Bielenberg-Catgulch, very stony complex, 4 to 15 percent slopes, in an area of rangeland, 800 feet south and 1,200 feet east of the northwest corner of sec. 31, T. 2 S., R. 4 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—9 to 20 inches; brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt2—20 to 29 inches; brown (10YR 5/3) gravelly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common

distinct clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

C—29 to 43 inches; brown (10YR 5/3) very gravelly coarse sandy loam, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; 5 percent cobbles and 35 percent pebbles; neutral; clear wavy boundary.

Cr—43 to 58 inches; highly weathered gneiss bedrock.

R—58 inches; hard gneiss bedrock.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to bedrock:* 40 to 60 inches

**A horizon**

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

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

Reaction: pH 6.1 to 7.3

**Bt1 horizon**

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Clay content: 20 to 35 percent

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

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

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 30 percent—0 to 5 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

**C horizon**

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy loam or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 10 percent cobbles; 15 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

**454D—Bielenberg-Catgulch, very stony complex, 4 to 15 percent slopes****Setting***Landform:*

- Bielenberg—Hills
- Catgulch—Hills

*Slope:*

- Bielenberg—4 to 15 percent
- Catgulch—4 to 15 percent

*Elevation:* 4,650 to 5,750 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Bielenberg and similar soils: 75 percent

Catgulch and similar soils: 15 percent

**Minor Components**

Breeton coarse sandy loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Bielenberg***Surface layer texture:* Sandy clay loam*Depth class:* Deep (40 to 60 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.4 inches**Catgulch***Surface layer texture:* Very cobbly coarse sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.1 inches

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

**Management**

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

**454E—Bielenberg-Catgulch, very stony-Breeton complex, 15 to 45 percent slopes****Setting***Landform:*

- Bielenberg—Hills
- Catgulch—Hills
- Breeton—Hills

*Slope:*

- Bielenberg—15 to 45 percent
- Catgulch—15 to 45 percent
- Breeton—15 to 35 percent

*Elevation:* 4,400 to 6,400 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Bielenberg and similar soils: 40 percent

Catgulch and similar soils: 35 percent

Breeton and similar soils: 10 percent

**Minor Components**

Clasol soil: 0 to 7 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 3 percent

**Major Component Description****Bielenberg***Surface layer texture:* Sandy clay loam*Depth class:* Deep (40 to 60 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.4 inches**Catgulch***Surface layer texture:* Very cobbly coarse sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.1 inches**Breeton***Surface layer texture:* Coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

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

### Management

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

### Bigbear Series

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

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Relict stream terraces, escarpments, and hills

*Parent material:* Alluvium or colluvium

*Slope range:* 0 to 45 percent

*Elevation range:* 4,700 to 6,300 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

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

### Typical Pedon

Bigbear loam, 8 to 15 percent slopes, in an area of hayland, 800 feet south and 2,500 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

A—0 to 9 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to strong fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—9 to 13 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to strong fine granular; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common distinct clay films on faces of pedis and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—13 to 35 inches; yellowish brown (10YR 5/4) gravelly clay, dark yellowish brown (10YR 4/4) moist, moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, and very plastic; few very fine roots; many prominent clay films on faces of pedis and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bk—35 to 60 inches; yellowish brown (10YR 5/6) very cobbly sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; 5 percent stones, 20 percent cobbles, and 15 percent pebbles; common large masses of lime; violently effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

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

#### A horizon

Value: 3 or 4 dry; 2 or 3 moist

Texture: Loam or clay loam

Clay content: 18 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 30 percent—0 to 10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

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

Chroma: 3, 4, 5, or 6

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 40 percent

Content of rock fragments: 15 to 45 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 10 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

**65E—Bigbear clay loam,  
15 to 35 percent slopes****Setting**

*Landform:* Escarpments  
*Slope:* 15 to 35 percent  
*Elevation:* 4,800 to 6,150 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

**Composition****Major Components**

Bigbear and similar soils: 85 percent

**Minor Components**

Burnel loam: 0 to 5 percent  
 Storyhill cobbly loam: 0 to 5 percent  
 Bigbear stony loam: 0 to 3 percent  
 Soils with slopes more than 35 percent: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

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

**Management**

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

**65B—Bigbear loam, 0 to 4 percent slopes****Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 5,500 to 6,100 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

**Composition****Major Components**

Bigbear and similar soils: 90 percent

**Minor Components**

Soils with slopes more than 4 percent: 0 to 5 percent  
 Storyhill cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

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

**Management**

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

**65C—Bigbear loam, 4 to 8 percent slopes****Setting**

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,700 to 6,000 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

**Composition****Major Components**

Bigbear and similar soils: 90 percent

**Minor Components**

Bigbear cobbly loam: 0 to 5 percent  
 Burnel loam: 0 to 3 percent  
 Storyhill cobbly loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

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

### Management

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

### 65D—Bigbear loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,800 to 6,300 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Bigbear and similar soils: 90 percent

##### Minor Components

Bigbear cobbly loam: 0 to 5 percent

Burnel loam: 0 to 3 percent

Storyhill cobbly loam: 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.0 inches

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

#### Management

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

### 365D—Bigbear, stony-Storyhill, very stony complex, 4 to 15 percent slopes

#### Setting

*Landform:*

- Bigbear—Hills

- Storyhill—Hills

*Slope:*

- Bigbear—4 to 15 percent

- Storyhill—4 to 15 percent

*Elevation:* 5,350 to 6,100 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Bigbear and similar soils: 65 percent

Storyhill and similar soils: 25 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

##### Bigbear

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

##### Storyhill

*Surface layer texture:* Very cobbly 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 5.6 inches

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

#### Management

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

### 665E—Bigbear-Storyhill-Adel complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Bigbear—Hills

- Storyhill—Hills

- Adel—Hills

*Slope:*

- Bigbear—15 to 45 percent

- Storyhill—15 to 45 percent

- Adel—15 to 45 percent

*Elevation:* 4,750 to 5,950 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 65 to 95 days

## Composition

### Major Components

Bigbear and similar soils: 40 percent  
 Storyhill and similar soils: 25 percent  
 Adel and similar soils: 20 percent

### Minor Components

Bigbear stony loam: 0 to 10 percent  
 Soils with slopes more than 45 percent: 0 to 5 percent

## Major Component Description

### Bigbear

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

### Storyhill

*Surface layer texture:* Cobbly 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 6.1 inches

### Adel

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

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

## Management

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

## Bigsandy Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Permeability:* Moderately slow  
*Landform:* Stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 3,950 to 4,350 feet

*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 44 degrees F  
*Frost-free period:* 95 to 115 days

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

## Typical Pedon

Bigsandy silty clay loam, in an area of Bigsandy-Slickspots complex, 0 to 2 percent slopes, in an area of rangeland, 200 feet south and 2,200 feet east of the northwest corner of sec. 28, T. 1 N., R. 2 E.

A—0 to 3 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 5/1) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; violently effervescent; very strongly alkaline; clear smooth boundary.

C1—3 to 9 inches; grayish brown (10YR 5/2) silty clay loam, gray (10YR 6/1) dry; weak medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; very strongly alkaline; clear smooth boundary.

C2—9 to 17 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 6/1) dry; silty clay loam; massive; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; strongly alkaline; clear smooth boundary.

Cg1—17 to 35 inches; gray (10YR 5/1) silty clay loam, gray (10YR 6/1) dry; massive; extremely hard, firm, slightly sticky, and slightly plastic; few very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Cg2—35 to 60 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; massive; extremely hard, firm, slightly sticky, and slightly plastic; few very fine roots; violently effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 43 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to seasonal high water table:* 12 to 24 inches

### A horizon

Hue: 10YR or 2.5Y  
 Value: 3 or 4 moist; 4, 5, or 6 dry  
 Chroma: 1 or 2  
 Clay content: 27 to 35 percent  
 Electrical conductivity (mmhos/cm): 4 to 8  
 Sodium adsorption ratio: 13 to 30  
 Calcium carbonate equivalent: 20 to 40 percent  
 Reaction: pH 7.9 to 9.6

**C horizons**

Hue: 10YR or 2.5Y  
 Value: 4 or 5 moist; 5 or 6 dry  
 Chroma: 1 or 2  
 Texture: Silty clay loam, clay loam, silt loam, or loam  
 Clay content: 18 to 35 percent  
 Electrical conductivity (mmhos/cm): 4 to 8  
 Sodium adsorption ratio: 13 to 30  
 Calcium carbonate equivalent: 40 to 55 percent  
 Reaction: pH 7.9 to 9.6

**Cg horizons**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 4 or 5 moist; 5 or 6 dry  
 Chroma: 1 or 2  
 Texture: Silty clay loam, loam, clay loam, or silt loam  
 Clay content: 18 to 35 percent  
 Electrical conductivity (mmhos/cm): 4 to 8  
 Sodium adsorption ratio: 4 to 20  
 Calcium carbonate equivalent: 25 to 50 percent  
 Reaction: pH 7.9 to 9.0

*Note:* The Bigsandy soil as mapped in Gallatin County is a taxadjunct to the series. It has carbonatic mineralogy.

## 544A—Bigsandy-Slickspots complex, 0 to 2 percent slopes

### Setting

**Landform:**

- Bigsandy—Stream terraces
- Slickspots—Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 3,950 to 4,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

**Major Components**

Bigsandy and similar soils: 60 percent

Slickspots: 25 percent

**Minor Components**

Threeriv loam: 0 to 10 percent

Greycliff loam: 0 to 5 percent

### Major Component Description

**Bigsandy**

*Surface layer texture:* Silty clay loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.3 inches

**Slickspots**

*Definition:* A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

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

### Management

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

### Billman Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Sedimentary plains and hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 2 to 60 percent

*Elevation range:* 4,900 to 6,900 feet

*Annual precipitation:* 17 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 100 days

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

### Typical Pedon

Billman clay loam, in an area of Billman-Wilsall-Tolbert complex, 8 to 45 percent slopes, in an area of hayland, 2,200 feet north and 2,200 feet west of the southeast corner of sec. 11, T. 2 S., R. 6 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent pebbles; neutral; clear wavy boundary.

Bt1—7 to 15 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, and moderately plastic; common very fine

and fine roots and few medium roots; common distinct clay films on faces of pedes and lining pores; 5 percent pebbles; neutral; clear wavy boundary.

Bt2—15 to 23 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; strong medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of pedes and lining pores; 5 percent pebbles; neutral; clear wavy boundary.

Cr1—23 to 38 inches; brown (7.5YR 4/2) moist; semiconsolidated shale that textures to silty clay loam; neutral.

Cr2—38 to 60 inches; dark gray (5YR 4/1) moist; semiconsolidated shale.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 16 inches

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

#### A horizon

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

Value: 2 or 3 moist

Chroma: 1 or 2

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt1 horizon

Hue: 7.5YR, 5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, silty clay loam, or silty clay

Clay content: 35 to 50 percent

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

Reaction: pH 6.6 to 7.3

#### Bt2 horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, silty clay loam, or silty clay

Clay content: 35 to 50 percent

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

Reaction: pH 6.6 to 7.3

## 660F—Billman, stony-Bangtail-Tolbert, stony complex, 25 to 60 percent slopes

### Setting

#### Landform:

- Billman—Hills, south aspects
- Bangtail—Hills, north aspects
- Tolbert—Hills, south aspects

#### Slope:

- Billman—25 to 60 percent
- Bangtail—25 to 60 percent
- Tolbert—25 to 60 percent

*Elevation:* 4,900 to 6,900 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Billman and similar soils: 40 percent

Bangtail and similar soils: 30 percent

Tolbert and similar soils: 15 percent

#### Minor Components

Adel loam: 0 to 8 percent

Timberlin loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Billman

*Surface layer texture:* Cobbly clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

#### Bangtail

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

#### Tolbert

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.8 inches

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

### Management

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

## 860F—Billman-Adel-Tolbert complex, 25 to 60 percent slopes

### Setting

*Landform:*

- Billman—Hills
- Adel—Hills
- Tolbert—Hills

*Slope:*

- Billman—25 to 45 percent
- Adel—25 to 45 percent
- Tolbert—25 to 60 percent

*Elevation:* 5,350 to 6,550 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Billman and similar soils: 50 percent  
 Adel and similar soils: 25 percent  
 Tolbert and similar soils: 15 percent

#### Minor Components

Bridger loam: 0 to 8 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Billman

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

#### Adel

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

#### Tolbert

*Surface layer texture:* Very channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

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

### Management

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

## 760C—Billman-Wilsall clay loams, 2 to 8 percent slopes

### Setting

*Landform:*

- Billman—Sedimentary plains
- Wilsall—Sedimentary plains

*Slope:*

- Billman—2 to 8 percent
- Wilsall—2 to 8 percent

*Elevation:* 5,300 to 6,200 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Billman and similar soils: 60 percent  
 Wilsall and similar soils: 30 percent

#### Minor Components

Burnel clay loam: 0 to 5 percent  
 Tolbert channery loam: 0 to 5 percent

### Major Component Description

#### Billman

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

### **Wilsall**

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.9 inches

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

### **Management**

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

## **760E—Billman-Wilsall clay loams, 8 to 25 percent slopes**

### **Setting**

#### *Landform:*

- Billman—Hills
- Wilsall—Hills

#### *Slope:*

- Billman—8 to 25 percent
- Wilsall—8 to 25 percent

*Elevation:* 4,950 to 6,250 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### **Composition**

#### **Major Components**

Billman and similar soils: 50 percent

Wilsall and similar soils: 40 percent

#### **Minor Components**

Tolbert channery loam: 0 to 5 percent

Burnel clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### **Major Component Description**

#### **Billman**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

### **Wilsall**

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.9 inches

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

### **Management**

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

## **960E—Billman-Wilsall-Tolbert complex, 8 to 45 percent slopes**

### **Setting**

#### *Landform:*

- Billman—Hills
- Wilsall—Hills
- Tolbert—Hills

#### *Slope:*

- Billman—8 to 45 percent
- Wilsall—8 to 45 percent
- Tolbert—8 to 45 percent

*Elevation:* 4,950 to 6,300 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### **Composition**

#### **Major Components**

Billman and similar soils: 50 percent

Wilsall and similar soils: 20 percent

Tolbert and similar soils: 20 percent

#### **Minor Components**

Burnel loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

### **Major Component Description**

#### **Billman**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

### **Wilsall**

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

### **Tolbert**

*Surface layer texture:* Very channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

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

### **Management**

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

### **Binna Series**

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

*Drainage class:* Well drained

*Permeability:* Moderate above 30 inches and rapid below

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,150 to 4,550 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

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

### **Typical Pedon**

Binna loam, in an area of Binna-Slickspots complex, moderately wet, 0 to 2 percent slopes, in an area of pasture, 700 feet north and 400 feet east of the southwest corner of sec. 9, T. 1 S., R. 2 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bw—8 to 15 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—15 to 26 inches; light gray (10YR 7/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent pebbles; common medium masses and seams of lime; violently effervescent, moderately alkaline; clear smooth boundary.

2Bk2—26 to 30 inches; light gray (10YR 7/2) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 30 percent cobbles and 25 percent pebbles; common medium masses and seams of lime; violently effervescent; strongly alkaline; clear smooth boundary.

2C—30 to 60 inches; variegated extremely cobbly loamy coarse sand; massive; loose, nonsticky, and nonplastic; 35 percent cobbles and 30 percent pebbles; slightly effervescent; slightly alkaline.

### **Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

#### *Ap horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 7.4 to 8.4

#### *Bw horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2 or 3

Texture: Loam or clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 0 to 10 percent pebbles  
 Reaction: pH 7.4 to 8.4

**Bk1 horizon**

Hue: 10YR or 2.5Y  
 Value: 7 or 8 dry; 4, 5, or 6 moist  
 Chroma: 2 or 3  
 Texture: Loam, silt loam, sandy loam, or sandy clay loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 9.0

**2Bk2 horizon**

Hue: 10YR, 2.5Y, or variegated  
 Value: 6, 7, or 8 dry; 4, 5, or 6 moist  
 Chroma: 2 or 3  
 Texture: Loam, silt loam, sandy loam, or sandy clay loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 35 to 80 percent—25 to 35 percent cobbles; 20 to 60 percent pebbles  
 Calcium carbonate equivalent: 15 to 35 percent  
 Reaction: pH 7.9 to 9.0

**2C horizon**

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 5 or 6 moist  
 Texture: Loamy sand, sand, or loamy coarse sand  
 Clay content: 5 to 10 percent  
 Content of rock fragments: 35 to 80 percent—5 to 35 percent cobbles; 30 to 45 percent pebbles  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

**516A—Binna loam, 0 to 2 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Elevation:* 4,150 to 4,550 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Binna and similar soils: 85 percent

**Minor Components**

Lamoose loam: 0 to 10 percent  
 Rivra gravelly sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Available water capacity:* Mainly 6.9 inches

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

**Management**

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

**527A—Binna-Slickspots complex, moderately wet, 0 to 2 percent slopes****Setting**

*Landform:*

- Binna—Stream terraces
- Slickspots—Stream terraces

*Slope:* 0 to 2 percent  
*Elevation:* 4,200 to 4,300 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Binna and similar soils: 75 percent  
 Slickspots: 15 percent

**Minor Components**

Beaverell cobbly loam: 0 to 5 percent  
 Binna clay loam: 0 to 5 percent

**Major Component Description****Binna**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.9 inches

**Slickspots**

*Definition:* A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

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

### Management

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

### Birney Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 4,000 to 5,050 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 43 to 45 degrees F

*Frost-free period:* 100 to 120 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Aridic Haplustepts

### Typical Pedon

Birney loam, 2 to 8 percent slopes, in an area of rangeland, 900 feet east and 800 feet north of the southwest corner of sec. 5, T. 3 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; moderately alkaline; clear smooth boundary.

Bw—4 to 11 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist, moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk1—11 to 20 inches; pale brown (10YR 6/3) very channery sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; 25 percent channers and 15 percent pebbles; common distinct lime coatings on rock fragments; few lime pendants on undersides of rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—20 to 60 inches; pale brown (10YR 6/3) very channery sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very

friable, slightly sticky, and nonplastic; few very fine roots; 35 percent channers and 15 percent pebbles; common distinct lime coatings on rock fragments and many lime pendants on undersides of rock fragments; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Depth to the Bk horizon:* 10 to 15 inches

#### A horizon

Hue: 5YR, 7.5YR, or 10YR

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

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 15 to 25 percent

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

Reaction: pH 7.9 to 8.4

#### Bw horizon

Hue: 5YR, 7.5YR, or 10YR

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

Chroma: 2, 3, 4, or 6

Texture: Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent pebbles or channers

Reaction: pH 7.9 to 8.4

#### Bk horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Sandy loam or loam

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 70 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

### 128D—Birney channery loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,000 to 4,900 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 100 to 120 days

## Composition

### Major Components

Birney and similar soils: 85 percent

### Minor Components

Amesha loam: 0 to 5 percent

Birney very channery loam: 0 to 5 percent

Trimad cobbly loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

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

## Management

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

## 28C—Birney loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

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

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 100 to 120 days

### Composition

#### Major Components

Birney and similar soils: 90 percent

#### Minor Components

Amesha loam: 0 to 5 percent

Busby 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

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

## Management

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

### *Blackdog Series*

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Relict stream terraces

*Parent material:* Loess

*Slope range:* 0 to 15 percent

*Elevation range:* 4,350 to 5,800 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Blackdog silt loam, 0 to 4 percent slopes, in an area of cropland, 850 feet south and 1,500 feet east of the northwest corner of sec. 26, T. 1 N., R. 5 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; neutral; clear smooth boundary.

A2—6 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and moderately plastic; few very fine roots; neutral; clear smooth boundary.

Bt1—10 to 14 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds and lining pores; slightly alkaline; clear smooth boundary.

Bt2—14 to 19 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common faint clay films on faces of peds and lining pores; slightly alkaline; abrupt smooth boundary.

Bk1—19 to 26 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 4/4) moist;

weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine threads and seams of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—26 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 18 to 30 inches

#### A horizon

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.6 to 7.3

#### Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.6 to 7.8

#### Bt2 horizon

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

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.6 to 7.8

*Note:* Some pedons contain a Bt3 horizon with silt loam textures.

#### Bk horizons

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

Chroma: 2, 3, or 4

Clay content: 15 to 25 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

### 50B—Blackdog silt loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,350 to 5,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Blackdog and similar soils: 90 percent

#### Minor Components

Meagher loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Quagle silt 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

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

### Management

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

### 50C—Blackdog silt loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,500 to 5,750 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Blackdog and similar soils: 90 percent

#### Minor Components

Meagher cobbly loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Quagle silt 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

A typical description with range in characteristics is 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—Blackdog silt loam, 8 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,500 to 5,700 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Blackdog and similar soils: 85 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Meagher cobbly loam: 0 to 3 percent

Beanlake 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

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

### Management

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

## 450B—Blackdog-Quagle silt loams, 0 to 4 percent slopes

### Setting

*Landform:*

- Blackdog—Relict stream terraces
- Quagle—Relict stream terraces

*Slope:*

- Blackdog—0 to 4 percent
- Quagle—0 to 4 percent

*Elevation:* 4,500 to 5,400 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Blackdog and similar soils: 60 percent

Quagle and similar soils: 30 percent

#### Minor Components

Beanlake loam: 0 to 5 percent

Bowery loam: 0 to 5 percent

### Major Component Description

#### Blackdog

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.9 inches

#### Quagle

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

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

### Management

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

## 450C—Blackdog-Quagle silt loams, 4 to 8 percent slopes

### Setting

*Landform:*

- Blackdog—Relict stream terraces
- Quagle—Relict stream terraces

*Slope:*

- Blackdog—4 to 8 percent
- Quagle—4 to 8 percent

*Elevation:* 4,400 to 5,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Blackdog and similar soils: 60 percent  
Quagle and similar soils: 30 percent

### Minor Components

Beanlake loam: 0 to 5 percent  
Bowery loam: 0 to 3 percent  
Anceney cobbly loam: 0 to 2 percent

### Major Component Description

#### Blackdog

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.9 inches

#### Quagle

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

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

## Management

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

### 450D—Blackdog-Brodyk silt loams, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Blackdog—Relict stream terraces
- Brodyk—Relict stream terraces

##### *Slope:*

- Blackdog—8 to 15 percent
- Brodyk—8 to 15 percent

*Elevation:* 4,500 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Blackdog and similar soils: 55 percent  
Brodyk and similar soils: 35 percent

### Minor Components

Beanlake loam: 0 to 5 percent  
Bowery loam: 0 to 3 percent  
Anceney cobbly loam: 0 to 2 percent

### Major Component Description

#### Blackdog

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.9 inches

#### Brodyk

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.4 inches

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

## Management

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

### ***Blackmore Series***

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Relict stream terraces

*Parent material:* Loess

*Slope range:* 0 to 15 percent

*Elevation range:* 4,700 to 5,600 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

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

### Typical Pedon

Blackmore silt loam, 4 to 8 percent slopes, in an area of hayland, 1,100 feet south and 1,800 feet west of the northeast corner of sec. 27, T. 2 S., R. 6 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; slightly acid; abrupt smooth boundary.

AB—6 to 10 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; moderate fine and medium angular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; neutral; abrupt wavy boundary.

Bt1—10 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist, with some very dark gray (10YR 3/1) moist, interfingering of mollic material; strong fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; neutral; gradual smooth boundary.

Bt2—15 to 27 inches; yellowish brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Bk1—27 to 42 inches; pale brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, firm, moderately sticky, and slightly plastic; few fine roots; many fine threads and seams of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—42 to 60 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common medium masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

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

### Ap and AB horizons

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 22 to 27 percent

Reaction: pH 6.1 to 7.3

### Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.1 to 7.3

### Bk1 horizon

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

Chroma: 3, 4, or 6

Texture: Silt loam or silty clay loam

Clay content: 15 to 30 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

### Bk2 horizon

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

Chroma: 3, 4, or 6

Texture: Silt loam or silty clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 8.4

## 350B—Blackmore silt loam, 0 to 4 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,850 to 5,550 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Blackmore and similar soils: 90 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 3 percent

Brodyk 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.3 inches

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

### Management

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

## 350C—Blackmore silt loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,750 to 5,600 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Blackmore and similar soils: 90 percent

#### Minor Components

Bowery loam: 0 to 4 percent  
 Brodyk silt loam: 0 to 3 percent  
 Doughty cobbly 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.3 inches

A typical description with range in characteristics is 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—Blackmore silt loam, 8 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,700 to 5,550 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

### Composition

#### Major Components

Blackmore and similar soils: 90 percent

#### Minor Components

Bowery loam: 0 to 5 percent  
 Doughty cobbly loam: 0 to 3 percent  
 Brodyk 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.3 inches

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

### Management

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

## Blacksheep Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid  
*Landform:* Escarpments  
*Parent material:* Semiconsolidated, sandy sedimentary beds  
*Slope range:* 15 to 45 percent  
*Elevation range:* 3,950 to 5,400 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

### Typical Pedon

Blacksheep cobbly sandy loam in an area of Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes, in an area of rangeland, 1,100 feet north and 1,000 feet east of the southwest corner of sec. 7, T. 1 S., R. 2 E.

A—0 to 6 inches; light brownish gray (10YR 6/2) cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and nonplastic; many very fine and fine and few medium roots; common very fine continuous irregular pores; 15 percent cobbles and 15 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

C—6 to 16 inches; light gray (10YR 7/2) sandy loam, brown (10YR 5/3) moist; massive; soft, loose, nonsticky, and nonplastic; common very fine and fine and few medium roots; common very fine continuous irregular pores; 5 percent cobbles and 5 percent pebbles; strongly effervescent; moderately alkaline; gradual irregular boundary.

Cr—16 to 60 inches; semiconsolidated, calcareous sandstone.

### Range in Characteristics

*Soil temperature:* 43 to 47 inches

*Moisture control section:* Between 8 and 16 inches

#### A horizon

Hue: 2.5Y, 10YR, or 7.5YR

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

Chroma: 2 or 3

Clay content: 5 to 15 percent

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

Reaction: pH 7.4 to 8.4

#### C horizon

Hue: 2.5Y, 10YR, or 7.5YR

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

Chroma: 2 or 3

Texture: Fine sandy loam, sandy loam, or very fine sandy loam

Clay content: 10 to 18 percent

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

Reaction: pH 7.9 to 9.0

*Note:* Some pedons may contain a Bk horizon.

## 811E—Blacksheep, moist-Kalsted-Scravo complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Blacksheep—Escarpments
- Kalsted—Escarpments
- Scravo—Escarpments

#### Slope:

- Blacksheep—15 to 45 percent
- Kalsted—15 to 45 percent
- Scravo—15 to 45 percent

*Elevation:* 4,000 to 5,400 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Blacksheep and similar soils: 50 percent

Kalsted and similar soils: 20 percent

Scravo and similar soils: 20 percent

#### Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.0 inches

#### Kalsted

*Surface layer texture:* Sandy 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 6.9 inches

#### Scravo

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.1 inches

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

### Management

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

## 410E—Blacksheep-Chinook-Rock outcrop complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Blacksheep—Escarpments
- Chinook—Escarpments
- Rock outcrop—Escarpments

*Slope:*

- Blacksheep—15 to 45 percent
- Chinook—15 to 35 percent

*Elevation:* 4,200 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Blacksheep and similar soils: 45 percent

Chinook and similar soils: 30 percent

Rock outcrop: 15 percent

#### Minor Components

Kalsted sandy loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.1 inches

#### Chinook

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

### Rock outcrop

*Definition:* Exposures of sandy sedimentary bedrock.

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

### Management

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

## 711E—Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Blacksheep—Escarpments
- Kalsted—Escarpments
- Scravo—Escarpments

*Slope:*

- Blacksheep—15 to 45 percent
- Kalsted—15 to 45 percent
- Scravo—15 to 45 percent

*Elevation:* 3,950 to 5,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Blacksheep and similar soils: 45 percent

Kalsted and similar soils: 25 percent

Scravo and similar soils: 20 percent

#### Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.0 inches

### **Kalsted**

*Surface layer texture:* Sandy 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 6.9 inches

### **Scravo**

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.1 inches

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

## **Management**

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

## **Blaincreek Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills

*Parent material:* Argillite residuum

*Slope range:* 2 to 70 percent

*Elevation range:* 4,400 to 6,600 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-skeletal, mixed, superactive, frigid Typic Argiustolls

## **Typical Pedon**

Blaincreek loam, in an area of Tolbert-Blaincreek-Adel complex, 15 to 45 percent slopes, in an area of rangeland, 1,700 feet south and 1,000 feet west of the northeast corner of sec. 14, T. 3 N., R. 3 E.

A—0 to 5 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; 5 percent flagstones and 10 percent channers; neutral; clear wavy boundary.

Bt1—5 to 10 inches; dark grayish brown (10YR 4/2) channery clay loam, very dark grayish brown (10YR 3/2) moist; weak, medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent flagstones and 30 percent channers; neutral; clear wavy boundary.

Bt2—10 to 15 inches; brown (10YR 5/3) very channery clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 10 percent flagstones and 40 percent channers; neutral; gradual wavy boundary.

Bt3—15 to 23 inches; yellowish brown (10YR 5/4) extremely channery sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films of faces of peds; 10 percent flagstones and 50 percent channers; neutral; gradual smooth boundary.

R—23 inches; argillite bedrock.

## **Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

*Depth to bedrock:* 20 to 40 inches

### *A horizon*

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles or flagstones; 0 to 30 percent pebbles or channers

Reaction: pH 6.1 to 7.3

### *Bt1 horizon*

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 30 to 60 percent—0 to 10 percent cobbles or flagstones; 30 to 50 percent pebbles or channers  
 Reaction: pH 6.6 to 7.8

**Bt2 horizon**

Hue: 10YR or 7.5YR  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam or clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 35 to 60 percent—5 to 10 percent flagstones; 30 to 50 percent channers  
 Reaction: pH 6.6 to 7.8

**Bt3 horizon**

Hue: 10YR or 7.5YR  
 Value: 4, 5, or 6 dry; 4 or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam, clay loam, or sandy clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 45 to 70 percent—10 to 15 percent flagstones; 35 to 55 percent channers  
 Reaction: pH 6.6 to 7.8

### **439G—Blaincreek-Tolbert complex, 40 to 70 percent slopes**

#### **Setting**

**Landform:**

- Blaincreek—Hills
- Tolbert—Hills

**Slope:**

- Blaincreek—45 to 70 percent
- Tolbert—45 to 70 percent

**Elevation:** 5,000 to 6,200 feet

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

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

#### **Composition**

**Major Components**

Blaincreek and similar soils: 50 percent  
 Tolbert and similar soils: 40 percent

**Minor Components**

Adel loam: 0 to 5 percent  
 Tolex and similar soils: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### **Major Component Description**

**Blaincreek**

**Surface layer texture:** Channery loam  
**Depth class:** Moderately deep (20 to 40 inches)  
**Drainage class:** Well drained  
**Dominant parent material:** Argillite residuum  
**Native plant cover type:** Rangeland  
**Flooding:** None  
**Available water capacity:** Mainly 2.3 inches

**Tolbert**

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

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

### **Management**

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

### **Blossberg Series**

**Depth class:** Very deep (more than 60 inches)  
**Drainage class:** Poorly drained  
**Permeability:** Moderate above the 2C horizon and rapid below  
**Landform:** Stream terraces  
**Parent material:** Alluvium  
**Slope range:** 0 to 2 percent  
**Elevation range:** 4,200 to 5,550 feet  
**Annual precipitation:** 12 to 18 inches  
**Annual air temperature:** 39 to 43 degrees F  
**Frost-free period:** 90 to 110 days

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

#### **Typical Pedon**

Blossberg loam, 0 to 2 percent slopes, in an area of pasture, 2,400 feet south and 1,800 feet east of the northwest corner of sec. 20, T. 2 S., R. 5 E.

A1—0 to 2 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; soft, very friable, slightly

sticky, and slightly plastic; many very fine, fine, and medium roots; slightly alkaline; abrupt smooth boundary.

A2—2 to 10 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and common fine and medium roots; slightly alkaline; clear smooth boundary.

Bg1—10 to 15 inches; very dark grayish brown (10YR 3/2) loam, dark brown (10YR 3/3) dry; many medium prominent red (2.5YR 5/6) redox concentrations; weak fine subangular blocky structure; very hard, friable, moderately sticky, and slightly plastic; few medium roots, common fine roots, and many very fine roots; 3 percent pebbles; slightly alkaline; clear smooth boundary.

Bg2—15 to 24 inches; very dark grayish brown (10YR 3/2) sandy clay loam, dark grayish brown (10YR 4/2) dry; few fine prominent red (2.5YR 5/6) redox concentrations; weak fine subangular blocky structure; soft, friable, moderately sticky, and slightly plastic; few fine and common very fine roots; 10 percent pebbles; neutral; gradual smooth boundary.

2C—24 to 60 inches; variegated extremely gravelly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 40 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 24 inches

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

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

#### A horizons

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

#### Bg horizons

Hue: 2.5Y, 5Y, or 10YR

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

Chroma: 2 or 3

Texture: Loam, clay loam, or sandy clay loam

Clay content: 20 to 32 percent

Content of rock fragments: 0 to 30 percent—0 to

10 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

#### 2C horizon

Texture: Loamy coarse sand, coarse sand, loamy sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—20 to 30 percent cobbles; 15 to 50 percent pebbles

Reaction: pH 6.6 to 7.8

### 542A—Blossberg loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,200 to 5,550 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Blossberg and similar soils: 85 percent

##### Minor Components

Bonebasin loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.2 inches

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

#### Management

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

### Bobkitty Series

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

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 3,950 to 5,700 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 42 to 45 degrees F  
*Frost-free period:* 95 to 120 days

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

### Typical Pedon

Bobkitty loam, in an area of Bobkitty-Bonebasin complex, 0 to 2 percent slopes, in an area of pasture, 2,100 feet south and 1,000 feet west of the northeast corner of sec. 1, T. 3 N., R. 2 E.

- A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and common fine roots and few medium roots; moderately alkaline; clear smooth boundary.
- C1—5 to 10 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, and slightly plastic; common very fine and fine and few medium roots; violently effervescent; strongly alkaline; clear smooth boundary.
- C2—10 to 24 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; violently effervescent; very strongly alkaline; clear smooth boundary.
- Cg—24 to 48 inches; light brownish gray (10YR 6/2) stratified silty clay loam and loam, dark gray (10YR 4/1) moist; common faint dark yellowish brown (10YR 4/6) moist redox concentrations; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.
- 2C—48 to 60 inches; light gray (10YR 7/1) stratified sandy loam and loamy sand, gray (10YR 5/1) moist; common fine and medium prominent dark yellowish brown (10YR 4/6) moist redox concentrations; single grain; soft, very friable, nonsticky, and nonplastic; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches  
*Depth to seasonal high water table:* 24 to 42 inches

#### A horizon

Value: 2 or 3 moist; 4 or 5 dry  
 Chroma: 1 or 2  
 Texture: Loam or clay loam  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 2 to 10 percent  
 Electrical conductivity (mmhos/cm): 2 to 8  
 Reaction: pH 7.9 to 8.4

#### C1 horizon

Value: 3 or 4 moist; 5 or 6 dry  
 Texture: Loam, silt loam, or silty clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Sodium adsorption ratio: 13 to 30  
 Calcium carbonate equivalent: 2 to 10 percent  
 Electrical conductivity (mmhos/cm): 2 to 8  
 Reaction: pH 8.5 to 9.6

#### C2 horizon

Texture: Loam, silt loam, or silty clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Sodium adsorption ratio: 13 to 30  
 Calcium carbonate equivalent: 2 to 10 percent  
 Electrical conductivity (mmhos/cm): 2 to 8  
 Reaction: pH 8.5 to 9.6

#### Cg horizon

Hue: 10YR, 2.5Y, or 5Y  
 Value: 6 or 7 dry  
 Chroma: 1 or 2  
 Texture: Loam consisting of fine stratification of sandy loam, silt loam, and silty clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Sodium adsorption ratio: 5 to 20  
 Calcium carbonate equivalent: 2 to 10 percent  
 Electrical conductivity (mmhos/cm): 2 to 8  
 Reaction: pH 7.9 to 9.0

#### 2C horizon

Value: 5 or 6 moist; 6 or 7 dry  
 Chroma: 1 or 2  
 Texture: Loamy sand consisting of fine stratification of sandy loam, loam, and sand  
 Clay content: 0 to 15 percent  
 Content of rock fragments: 0 to 40 percent—0 to 15 percent cobbles; 0 to 25 percent pebbles  
 Reaction: pH 7.9 to 8.4

### 520B—Bobkitty clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,950 to 4,300 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 120 days

#### Composition

##### Major Components

Bobkitty and similar soils: 85 percent

##### Minor Components

Slickspots: 0 to 8 percent  
 Threeriv loam: 0 to 7 percent

#### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.1 inches

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

#### Management

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

### 500A—Bobkitty-Bonebasin complex, 0 to 2 percent slopes

#### Setting

*Landform:*

- Bobkitty—Flood plains
- Bonebasin—Stream terraces

*Slope:*

- Bobkitty—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 3,950 to 5,700 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 120 days

#### Composition

##### Major Components

Bobkitty and similar soils: 65 percent  
 Bonebasin and similar soils: 25 percent

##### Minor Components

Rivra gravelly sandy loam: 0 to 5 percent  
 Ryell sandy loam: 0 to 3 percent  
 Lamoose silt loam: 0 to 2 percent

#### Major Component Description

##### Bobkitty

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.1 inches

##### Bonebasin

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.0 inches

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

#### Management

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

#### *Bonebasin Series*

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Permeability:* Moderate above the 2C horizon and rapid in the 2C horizon  
*Landform:* Flood plains and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 3,950 to 6,100 feet  
*Annual precipitation:* 10 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 115 days

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

### Typical Pedon

Bonebasin loam, in an area of Lamoose-Rivra-Bonebasin complex, 0 to 2 percent slopes, in an area of pasture, 1,500 feet south and 2,600 feet east of the northwest corner of sec. 32, T. 2 N., R. 2 E.

Oa—0 to 4 inches; very dark grayish brown (10YR 3/2) muck, grayish brown (10YR 5/2) dry; strongly effervescent; moderately alkaline; clear smooth boundary.

Ag—4 to 15 inches; very dark grayish brown (2.5Y 3/2) loam, grayish brown (2.5Y 5/2) dry; moderate fine subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine, common fine, and few medium roots; slightly alkaline; gradual wavy boundary.

Cg—15 to 25 inches; olive gray (5Y 4/2) stratified loam and sandy loam, gray (5Y 5/1) dry; massive; soft, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; 10 percent pebbles; slightly alkaline; clear smooth boundary.

2C—25 to 60 inches; variegated very gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 40 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches

*Depth to seasonal high water table:* Ponded to 12 inches

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

#### Ag horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

#### Cg horizon

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

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

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam with strata of sandy loam, clay loam, sand, or gravel

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 25 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

#### 2C horizon

Texture: Loamy sand, loamy coarse sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.1 to 7.8

### Bowery Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans, stream terraces, and escarpments

*Parent material:* Alluvium or colluvium

*Slope range:* 2 to 45 percent

*Elevation range:* 4,450 to 6,300 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Bowery loam, 2 to 8 percent slopes, in an area of rangeland, 1,250 feet south and 800 feet east of the northwest corner of sec. 24, T. 4 N., R. 6 E.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine and very fine subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine roots; common very fine and fine pores; 5 percent pebbles; slightly acid; clear smooth boundary.

A2—9 to 22 inches; dark gray (10YR 4/1) loam; very dark brown (10YR 2/2) moist; moderate very fine subangular blocky structure parting to moderate fine and weak very fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common very fine and fine pores; 5 percent pebbles; neutral; gradual smooth boundary.

Bw1—22 to 36 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak fine and very fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common very fine and fine pores; 10 percent pebbles; neutral; gradual smooth boundary.

Bw2—36 to 60 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine roots; few very fine pores; 10 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 16 to 60 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bw horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 10 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

## 14C—Bowery loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Elevation:* 4,500 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Bowery and similar soils: 90 percent

#### Minor Components

Soils with slopes more than 8 percent: 0 to 5 percent

Burnel loam: 0 to 3 percent

Anceney cobbly loam: 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.2 inches

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

### Management

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

### Breton Series

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

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Alluvial fans, stream terraces, and hills

*Parent material:* Alluvium or colluvium

*Slope range:* 4 to 35 percent

*Elevation range:* 4,350 to 6,400 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Breton coarse sandy loam, 4 to 15 percent slopes, in an area of pasture, 300 feet north and 2,000 feet west of the southeast corner of sec. 12, T. 4 S., R. 3 E.

A1—0 to 10 inches; dark gray (10YR 4/1) coarse sandy loam, black (10YR 2/1) moist; moderate medium granular structure; hard, friable, slightly sticky, and nonplastic; many very fine and common fine roots, many very fine interstitial pores; 5 percent pebbles; slightly acid; clear smooth boundary.

A2—10 to 24 inches; dark gray (10YR 4/1) coarse sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very

fine interstitial pores; 5 percent pebbles; neutral; clear smooth boundary.

Bw—24 to 40 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 10 percent pebbles; neutral; clear wavy boundary.

BC—40 to 60 inches; grayish brown (10YR 5/2) gravelly coarse sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; 20 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 16 to 40 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 8 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.4

#### Bw horizon

Hue: 10YR or 2.5Y

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

Chroma: 2 or 3

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 8 to 18 percent

Content of rock fragments: 5 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

#### BC horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Coarse sandy loam, loamy coarse sand, or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 10 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

### 362D—Breeton coarse sandy loam, 4 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 15 percent

*Elevation:* 4,350 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Breeton and similar soils: 90 percent

#### Minor Components

Sawicki cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Coarse 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 6.8 inches

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

### Management

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

### Bridger Series

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Stream terraces, alluvial fans, drainageways, and hills

*Parent material:* Alluvium, colluvium, or alpine till

*Slope range:* 2 to 45 percent

*Elevation range:* 4,900 to 7,650 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

### Typical Pedon

Bridger loam, in an area of Bridger-Libeg, stony complex, 8 to 25 percent slopes, in an area of rangeland, 100 feet south and 1,700 feet east of the northwest corner of sec. 36, T. 6 S., R. 3 E.

A—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, friable, nonsticky, and nonplastic; many very fine and fine

and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

**Bt1**—8 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; slightly hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

**Bt2**—15 to 28 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (10YR 4/3) moist; weak medium prismatic structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear wavy boundary.

**Bk1**—28 to 49 inches; light gray (10YR 7/2) cobbly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, very sticky, and moderately plastic; few very fine, fine, and medium roots; 20 percent cobbles and 15 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk2**—49 to 60 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; very hard, firm, moderately sticky, and slightly plastic; 5 percent cobbles and 30 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 16 inches

*Depth to the Bk horizon:* 17 to 40 inches

#### A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 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 6.1 to 7.3

#### Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 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 6.1 to 7.8

#### Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 25 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 379E—Bridger cobbly loam, 15 to 35 percent slopes, stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 15 to 35 percent

*Elevation:* 5,200 to 7,150 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bridger and similar soils: 85 percent

#### Minor Components

Bridger loam: 0 to 5 percent

Redchief very stony loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

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

### Management

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

## 379D—Bridger cobbly loam, 8 to 15 percent slopes, stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 5,250 to 7,200 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bridger and similar soils: 85 percent

#### Minor Components

Bridger loam: 0 to 5 percent

Redchief very stony loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.5 inches

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

### Management

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

## 79C—Bridger loam, 2 to 8 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 2 to 8 percent

*Elevation:* 5,450 to 6,200 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bridger and similar soils: 85 percent

#### Minor Components

Bridger clay loam: 0 to 5 percent

Libeg cobbly loam: 0 to 5 percent

Soils with a water table at 4 to 8 feet: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

### Management

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

## 179E—Bridger loam, cool, 4 to 25 percent slopes

### Setting

*Landform:* Drainageways

*Slope:* 4 to 25 percent

*Elevation:* 4,900 to 6,850 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Bridger and similar soils: 90 percent

#### Minor Components

Bangtail loam: 0 to 5 percent

Redlodge silty clay loam: 0 to 3 percent

Soils with slopes more than 25 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:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

### Management

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

### 779E—Bridger-Libeg, stony complex, 8 to 25 percent slopes

#### Setting

##### *Landform:*

- Bridger—Hills
- Libeg—Hills

##### *Slope:*

- Bridger—8 to 25 percent
- Libeg—8 to 25 percent

*Elevation:* 6,050 to 7,300 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Bridger and similar soils: 50 percent

Libeg and similar soils: 35 percent

##### Minor Components

Libeg bouldery loam: 0 to 5 percent

Loberg stony loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

#### Major Component Description

##### **Bridger**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

##### **Libeg**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alpine till

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

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

### Management

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

### 496D—Bridger-Ouselfal, very stony-Redlodge complex, 4 to 15 percent slopes

#### Setting

##### *Landform:*

- Bridger—Drainageways
- Ouselfal—Hills
- Redlodge—Closed depressions

##### *Slope:*

- Bridger—8 to 15 percent
- Ouselfal—8 to 15 percent
- Redlodge—4 to 6 percent

*Elevation:* 6,150 to 7,400 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Bridger and similar soils: 40 percent

Ouselfal and similar soils: 35 percent

Redlodge and similar soils: 10 percent

##### Minor Components

Yellowmule loam: 0 to 10 percent

Soils with a water table at 2.5 to 4 feet: 0 to 5 percent

#### Major Component Description

##### **Bridger**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

##### **Ouselfal**

*Surface layer texture:* Very flaggy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

**Redlodge***Surface layer texture:* Silty clay*Depth class:* Very deep (more than 60 inches)*Drainage class:* Poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Available water capacity:* Mainly 10.5 inches

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

**Management**

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

**550E—Bridger-Redlodge complex,  
4 to 25 percent slopes****Setting***Landform:*

- Bridger—Drainageways
- Redlodge—Drainageways

*Slope:*

- Bridger—4 to 25 percent
- Redlodge—4 to 6 percent

*Elevation:* 5,100 to 6,300 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Bridger and similar soils: 75 percent

Redlodge and similar soils: 15 percent

**Minor Components**

Bavdark loam: 0 to 5 percent

Soils with a water table at 1.5 to 3 feet: 0 to 3 percent

Libeg stony loam: 0 to 2 percent

**Major Component Description****Bridger***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.8 inches**Redlodge***Surface layer texture:* Silty clay loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Available water capacity:* Mainly 10.8 inches

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

**Management**

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

**Brocko Series***Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Relict stream terraces and hills*Parent material:* Loess*Slope range:* 0 to 35 percent*Elevation range:* 3,950 to 5,250 feet*Annual precipitation:* 10 to 16 inches*Annual air temperature:* 41 to 45 degrees F*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Aridic Calcustepts

**Typical Pedon**

Brocko silt loam, 4 to 8 percent slopes, in an area of cropland, 1,320 feet north and 100 feet east of the southwest corner of sec. 12, T. 1 S., R. 1 E.

Ap—0 to 7 inches; pale brown (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—7 to 20 inches; light brownish gray (10YR 6/2) silt loam, dark brownish gray (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few medium roots; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—20 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark brownish gray (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very

fine and fine roots; few fine masses of 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:* 5 to 8 inches

#### Ap horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2 or 3

Clay content: 8 to 18 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

#### Bk horizons

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2 or 3

Texture: Silt loam or very fine sandy loam

Clay content: 8 to 18 percent

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

### 36B—Brocko silt loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,100 to 5,150 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Brocko and similar soils: 90 percent

##### Minor Components

Clarkstone silt loam: 0 to 5 percent

Kalsted 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.0 inches

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

### Management

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

### 36C—Brocko silt loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,000 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Brocko and similar soils: 90 percent

##### Minor Components

Clarkstone silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 3 percent

Soils with more than 8 percent slopes: 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.0 inches

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

### Management

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

### 36D—Brocko silt loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 3,950 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Brocko and similar soils: 90 percent

**Minor Components**

Clarkstone silt loam: 0 to 5 percent  
 Kalsted sandy loam: 0 to 3 percent  
 Soils with more than 15 percent slopes: 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.0 inches

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

**Management**

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

**336C—Brocko-Clarkstone silt loams,  
4 to 8 percent slopes****Setting***Landform:*

- Brocko—Relict stream terraces
- Clarkstone—Relict stream terraces

*Slope:*

- Brocko—4 to 8 percent
- Clarkstone—4 to 8 percent

*Elevation:* 4,150 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Brocko and similar soils: 50 percent  
 Clarkstone and similar soils: 35 percent

**Minor Components**

Kalsted sandy loam: 0 to 10 percent  
 Crago cobbly loam: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 2 percent

**Major Component Description****Brocko**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.0 inches

**Clarkstone**

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

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

**Management**

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

**336D—Brocko-Clarkstone silt loams,  
8 to 15 percent slopes****Setting***Landform:*

- Brocko—Relict stream terraces
- Clarkstone—Relict stream terraces

*Slope:*

- Brocko—8 to 15 percent
- Clarkstone—8 to 15 percent

*Elevation:* 4,000 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Brocko and similar soils: 50 percent  
 Clarkstone and similar soils: 35 percent

**Minor Components**

Kalsted sandy loam: 0 to 10 percent  
 Crago cobbly loam: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 2 percent

**Major Component Description****Brocko**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.0 inches

**Clarkstone**

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

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

**Management**

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

**Brodyk Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Relict stream terraces  
*Parent material:* Loess  
*Slope range:* 4 to 45 percent  
*Elevation range:* 4,200 to 5,800 feet  
*Annual precipitation:* 14 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

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

**Typical Pedon**

Brodyk silt loam, in an area of Quagle-Brodyk silt loams, 4 to 8 percent slopes, in an area of cropland, 1,900 feet north and 1,500 feet east of the southwest corner of sec. 12, T. 2 N., R. 4 E.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; strongly effervescent; slightly alkaline; abrupt smooth boundary.

Bk1—6 to 30 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular

blocky structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; disseminated lime; few fine seams of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bk horizon:* 5 to 7 inches

*Ap horizon*

Value: 5 or 6 dry  
 Chroma: 2 or 3  
 Clay content: 18 to 22 percent  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

*Bk1 horizon*

Value: 6 or 7 dry  
 Clay content: 10 to 18 percent  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 8.4

*Bk2 horizon*

Value: 6 or 7 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Silt loam or very fine sandy loam  
 Clay content: 10 to 18 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 8.4

**Burnel Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Stream terraces, alluvial fans, and drainageways  
*Parent material:* Alluvium  
*Slope range:* 2 to 8 percent  
*Elevation range:* 4,750 to 6,200 feet  
*Annual precipitation:* 18 to 22 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

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

**Typical Pedon**

Burnel silty clay loam, 2 to 8 percent slopes, in an area of hayland, 350 feet south and 2,600 feet east of the northwest corner of sec. 20, T. 1 S., R. 7 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—6 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt2—9 to 19 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; common distinct clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—19 to 35 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; many fine irregular masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—35 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, slightly sticky, and slightly plastic; 5 percent pebbles; many fine irregular masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 17 to 35 inches

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt1 horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt2 horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bk horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 12C—Burnel silty clay loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Elevation:* 4,750 to 6,000 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Burnel and similar soils: 90 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent

Soils with more than 8 percent slopes: 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

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

### Management

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

## 212C—Burnel-Nythar complex, 2 to 8 percent slopes

### Setting

#### Landform:

- Burnel—Drainageways
- Nythar—Drainageways

#### Slope:

- Burnel—2 to 8 percent
- Nythar—2 to 6 percent

*Elevation:* 4,900 to 6,200 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Burnel and similar soils: 75 percent

Nythar and similar soils: 15 percent

#### Minor Components

Billman clay loam: 0 to 5 percent

Enbar clay loam: 0 to 5 percent

### Major Component Description

#### Burnel

*Surface layer texture:* Clay loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.6 inches

#### Nythar

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 9.7 inches

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

### Management

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

### Busby Series

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

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 4,000 to 5,050 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 43 to 45 degrees F

*Frost-free period:* 100 to 120 days

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

### Typical Pedon

Busby loam, in an area of Busby-Birney complex, 0 to 4 percent slopes, in an area of cropland, 800 feet north and 400 feet west of the southeast corner of sec. 7, T. 3 N., R. 3 E.

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw1—4 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw2—11 to 16 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—16 to 20 inches; pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

C1—20 to 30 inches; pale brown (10YR 6/3) stratified sandy loam and fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; few very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; very pale brown (10YR 7/3) stratified fine sandy loam and loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; few very fine roots; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F  
*Moisture control section:* Between 8 and 24 inches  
*Depth to the BK horizon:* 10 to 20 inches

#### A horizon

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Clay content: 15 to 25 percent  
 Reaction: pH 7.9 to 8.4

#### Bw horizons

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or sandy loam  
 Clay content: 10 to 18 percent  
 Reaction: pH 7.9 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y  
 Value: 5, 6, or 7 dry; 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Clay content: 10 to 18 percent  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.9 to 8.4

#### C horizons

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Stratified sandy loam, fine sandy loam, and loamy sand  
 Clay content: 3 to 18 percent  
 Calcium carbonate equivalent: 0 to 15 percent  
 Reaction: pH 7.9 to 8.4

### 27B—Busby loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,300 to 4,500 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 100 to 120 days

#### Composition

##### Major Components

Busby and similar soils: 90 percent

##### Minor Components

Amesha loam: 0 to 5 percent  
 Trimad cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.0 inches

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

#### Management

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

### 727B—Busby-Birney complex, 0 to 4 percent slopes

#### Setting

##### Landform:

- Busby—Alluvial fans and stream terraces
- Birney—Alluvial fans and stream terraces

##### Slope:

- Busby—0 to 4 percent
- Birney—0 to 4 percent

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

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 100 to 120 days

#### Composition

##### Major Components

Busby and similar soils: 50 percent  
 Birney and similar soils: 35 percent

##### Minor Components

Alona silty clay loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Soils with slopes more than 4 percent: 0 to 5 percent

### Major Component Description

#### Busby

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.0 inches

#### Birney

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

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

### Management

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

## 727D—Busby-Birney complex, 4 to 15 percent slopes

### Setting

*Landform:*

- Busby—Alluvial fans and stream terraces
- Birney—Alluvial fans and stream terraces

*Slope:*

- Busby—4 to 15 percent
- Birney—4 to 15 percent

*Elevation:* 4,050 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 100 to 120 days

### Composition

#### Major Components

Busby and similar soils: 50 percent

Birney and similar soils: 35 percent

#### Minor Components

Birney cobbly loam: 0 to 5 percent

Chinook fine sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Busby

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.0 inches

#### Birney

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

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

### Management

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

## Cabba Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and escarpments

*Parent material:* Interbedded sandstone and shale residuum or semiconsolidated, loamy and clayey sedimentary beds

*Slope range:* 4 to 60 percent

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

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 37 to 43 degrees F

*Frost-free period:* 80 to 110 days

**Taxonomic Class:** Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents.

### Typical Pedon

Cabba silt loam in an area of Martinsdale-Cabba complex, 8 to 15 percent slopes, in an area of cropland, 2,800 feet north and 1,200 feet west of the southeast corner of sec. 15, T. 2 S., R. 3 E.

Ap—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—4 to 8 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—8 to 17 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and few fine roots; 10 percent soft angular siltstone

fragments; many medium masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Cr1—17 to 19 inches; light gray (10YR 7/2) highly weathered siltstone that crushes to loam; few fine roots in cracks; violently effervescent; strongly alkaline (pH 8.6); clear wavy boundary.

Cr2—19 to 60 inches; semiconsolidated siltstone.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

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

#### Ap horizon

Hue: 10YR or 2.5Y

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

Chroma: 1, 2, 3, or 4

Texture: Silt loam, loam, or clay loam

Clay content: 18 to 35 percent

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

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

#### Bk horizons

Hue: 10YR or 2.5Y

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

Chroma: 1 through 6

Texture: Loam or clay loam

Clay content: 18 to 35 percent

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

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

#### Cr horizons

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 1 through 6

### 315F—Cabba-Bacbuster complex, 15 to 60 percent slopes

#### Setting

##### Landform:

- Cabba—Escarpments
- Bacbuster—Escarpments

##### Slope:

- Cabba—15 to 60 percent
- Bacbuster—15 to 35 percent

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

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Cabba and similar soils: 50 percent

Bacbuster and similar soils: 40 percent

#### Minor Components

Norbert silty clay loam: 0 to 4 percent

Castner channery loam: 0 to 3 percent

Billman moist, clay loam: 0 to 2 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

#### Cabba

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

#### Bacbuster

*Surface layer texture:* Cobbly clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.5 inches

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

### Management

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

### 615F—Cabba-Castner complex, 15 to 60 percent slopes

#### Setting

##### Landform:

- Cabba—Escarpments
- Castner—Escarpments

##### Slope:

- Cabba—15 to 60 percent
- Castner—15 to 60 percent

*Elevation:* 4,550 to 6,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Cabba and similar soils: 50 percent  
Castner and similar soils: 35 percent

### Minor Components

Reedwest stony loam: 0 to 10 percent  
Rock outcrop: 0 to 5 percent

## Major Component Description

### Cabba

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.9 inches

### Castner

*Surface layer texture:* Very flaggy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

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

## Management

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

### 415D—Cabba-Reedwest complex, 4 to 15 percent slopes

## Setting

### *Landform:*

- Cabba—Hills
- Reedwest—Hills

### *Slope:*

- Cabba—4 to 15 percent
- Reedwest—4 to 15 percent

*Elevation:* 4,600 to 5,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Cabba and similar soils: 65 percent  
Reedwest and similar soils: 20 percent

### Minor Components

Beanlake loam: 0 to 5 percent  
Norbert silty clay: 0 to 5 percent  
Soils with slopes more than 15 percent: 0 to 5 percent

## Major Component Description

### Cabba

*Surface layer texture:* Clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

### Reedwest

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

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

## Management

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

### 747E—Cabba-Reedwest-Anceney complex, 15 to 45 percent slopes

## Setting

### *Landform:*

- Cabba—Escarpments
- Reedwest—Escarpments
- Anceney—Escarpments

### *Slope:*

- Cabba—25 to 45 percent
- Reedwest—15 to 35 percent
- Anceney—15 to 45 percent

*Elevation:* 4,500 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Cabba and similar soils: 35 percent  
 Reedwest and similar soils: 30 percent  
 Anceney and similar soils: 25 percent

### Minor Components

Bowery loam: 0 to 5 percent  
 Soils with slopes more than 45 percent: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

## Major Component Description

### Cabba

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

### Reedwest

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

### Anceney

*Surface layer texture:* Cobbly 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 5.0 inches

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

## Management

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

### Cabbart Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Sedimentary plains, hills, and escarpments

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 45 percent

*Elevation range:* 4,050 to 5,500 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

## Typical Pedon

Cabbart cobbly loam in an area of Cabbart-Amesha-Trimad complex, 15 to 45 percent slopes, in an area of rangeland, 1,500 feet south and 1,200 feet east of the northwest corner of sec. 7, T. 1 S., R. 1 E.

A—0 to 3 inches; grayish brown (10YR 5/2) cobbly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 10 percent cobbles, 10 percent pebbles, and 10 percent soft siltstone fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—3 to 12 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles, 5 percent pebbles, and 10 percent soft siltstone fragments; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—12 to 19 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine roots; 25 percent soft siltstone fragments; common fine masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Cr—19 to 60 inches; semiconsolidated, calcareous siltstone.

## Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

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

### A horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 15 to 27 percent  
 Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

**Bk horizons**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam, silt loam, or clay loam  
 Clay content: 18 to 35 percent  
 Content of rock fragments: 0 to 50 percent soft and hard fragments—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 50 percent soft siltstone fragments  
 Calcium carbonate equivalent: 15 to 25 percent  
 Reaction: pH 7.9 to 9.0

### 810E—Cabbart, moist-Amesha-Trimad complex, 15 to 45 percent slopes

#### Setting

**Landform:**

- Cabbart—Escarpments
- Amesha—Escarpments
- Trimad—Escarpments

**Slope:**

- Cabbart—15 to 45 percent
- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

**Elevation:** 4,050 to 5,250 feet

**Mean annual precipitation:** 10 to 14 inches

**Frost-free period:** 95 to 115 days

#### Composition

**Major Components**

Cabbart and similar soils: 50 percent

Amesha and similar soils: 25 percent

Trimad and similar soils: 15 percent

**Minor Components**

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

#### Major Component Description

**Cabbart**

**Surface layer texture:** Gravelly loam

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

**Drainage class:** Well drained

**Dominant parent material:** Semiconsolidated, loamy sedimentary beds

**Native plant cover type:** Forest land

**Flooding:** None

**Available water capacity:** Mainly 3.3 inches

**Amesha**

**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 8.3 inches

**Trimad**

**Surface layer texture:** Cobbly sandy loam

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

**Drainage class:** Well drained

**Dominant parent material:** Alluvium or colluvium

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 4.4 inches

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

#### Management

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

### 710C—Cabbart-Amesha loams, 2 to 8 percent slopes

#### Setting

**Landform:**

- Cabbart—Sedimentary plains
- Amesha—Sedimentary plains

**Slope:**

- Cabbart—2 to 8 percent
- Amesha—2 to 8 percent

**Elevation:** 4,250 to 5,250 feet

**Mean annual precipitation:** 10 to 14 inches

**Frost-free period:** 95 to 115 days

#### Composition

**Major Components**

Cabbart and similar soils: 55 percent

Amesha and similar soils: 30 percent

**Minor Components**

Headwaters loam: 0 to 10 percent

Rock outcrop: 0 to 5 percent

### Major Component Description

#### Cabbart

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.3 inches

#### Amesha

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

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

### Management

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

### 710D—Cabbart-Amesha loams, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Cabbart—Hills
- Amesha—Hills

##### *Slope:*

- Cabbart—8 to 15 percent
- Amesha—8 to 15 percent

*Elevation:* 4,050 to 5,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Cabbart and similar soils: 55 percent  
 Amesha and similar soils: 30 percent

#### Minor Components

Headwaters loam: 0 to 10 percent  
 Rock outcrop: 0 to 5 percent

### Major Component Description

#### Cabbart

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.3 inches

#### Amesha

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

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

### Management

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

### 710E—Cabbart-Amesha-Trimad complex, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Cabbart—Escarpments
- Amesha—Escarpments
- Trimad—Escarpments

##### *Slope:*

- Cabbart—15 to 45 percent
- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

*Elevation:* 4,050 to 5,500 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Cabbart and similar soils: 50 percent  
 Amesha and similar soils: 25 percent  
 Trimad and similar soils: 15 percent

#### Minor Components

Rock outcrop: 0 to 5 percent  
 Soils less than 10 inches deep to bedrock: 0 to 5 percent

### Major Component Description

#### Cabbart

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.3 inches

### Amesha

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.8 inches

### Trimad

*Surface layer texture:* Cobbly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

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

## Management

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

## Castner Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Hills and escarpments  
*Parent material:* Interbedded sandstone and shale residuum or argillite and sandstone residuum  
*Slope range:* 4 to 70 percent  
*Elevation range:* 4,300 to 6,800 feet  
*Annual precipitation:* 15 to 22 inches  
*Annual air temperature:* 39 to 45 degrees F  
*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Castner channery loam, in an area of Castner, very stony-Quigley, very stony-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 2,200 feet north and 2,200 feet east of the southwest corner of sec. 5, T. 2 N., R. 5 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent flagstones and 20 percent channers; neutral; clear smooth boundary.

A2—2 to 6 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, very friable, nonsticky, and nonplastic; common very fine and fine roots; 5 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bk—6 to 18 inches; light brownish gray (10YR 6/2) very channery loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; few very fine and fine roots; 5 percent flagstones and 45 percent channers; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

R—18 inches; hard sandstone.

## Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 8 and 18 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to bedrock:* 10 to 20 inches

*Depth to the Bk horizon:* 6 to 15 inches

### A1 horizon

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

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 10 to 18 percent

Content of rock fragments: 15 to 50 percent—5 to 15 percent stones; 0 to 15 percent cobbles or flagstones; 10 to 20 percent pebbles or channers

Reaction: pH 6.6 to 7.8

### A2 horizon

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

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 0 to 10 percent cobbles; 15 to 50 percent pebbles or channers

Reaction: pH 6.6 to 7.8

### Bk horizon

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

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

Chroma: 2 or 3

Texture: Loam or sandy loam  
 Clay content: 10 to 18 percent  
 Content of rock fragments: 40 to 80 percent—5 to 15 percent stones; 0 to 25 percent cobbles; 20 to 45 percent pebbles or channers  
 Calcium carbonate equivalent: 3 to 15 percent  
 Reaction: pH 7.4 to 8.4

**670E—Castner, very stony-Quigley, very stony-Rock outcrop complex, 15 to 45 percent slopes**

**Setting**

*Landform:*

- Castner—Hills
- Quigley—Hills
- Rock outcrop—Hills

*Slope:*

- Castner—15 to 45 percent
- Quigley—15 to 35 percent

*Elevation:* 4,750 to 6,250 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Castner and similar soils: 45 percent  
 Quigley and similar soils: 35 percent  
 Rock outcrop: 10 percent

**Minor Components**

Absarook loam: 0 to 5 percent  
 Quigley bouldery loam: 0 to 5 percent

**Major Component Description**

**Castner**

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

**Quigley**

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

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

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

**Management**

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

**770F—Castner-Reedwest-Rock outcrop complex, 25 to 60 percent slopes**

**Setting**

*Landform:*

- Castner—Escarpments
- Reedwest—Escarpments
- Rock outcrop—Escarpments

*Slope:*

- Castner—25 to 60 percent
- Reedwest—25 to 35 percent

*Elevation:* 4,500 to 6,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Castner and similar soils: 60 percent  
 Reedwest and similar soils: 20 percent  
 Rock outcrop: 10 percent

**Minor Components**

Bacbuster clay loam: 0 to 5 percent  
 Farnuf loam: 0 to 5 percent

**Major Component Description**

**Castner**

*Surface layer texture:* Channery loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

**Reedwest**

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

### Rock outcrop

*Definition:* Exposures of sandstone bedrock.

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

### Management

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

### Catgulch Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills

*Parent material:* Gneiss or schist residuum

*Slope range:* 4 to 75 percent

*Elevation range:* 4,350 to 7,150 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-skeletal, mixed, superactive, frigid Lithic Haplustolls

### Typical Pedon

Catgulch very cobbly coarse sandy loam, in an area of Bielenberg-Catgulch, very stony-Breton complex, 15 to 45 percent slopes, in an area of rangeland, 1,200 feet north and 1,600 feet east of the southwest corner of sec. 15, T. 3 S., R. 3 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) very cobbly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 5 percent stones, 15 percent cobbles, and 30 percent pebbles; neutral; clear smooth boundary.

Bw—5 to 15 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; common very fine and fine roots; 5 percent stones, 15 percent cobbles, and 35 percent pebbles; neutral; clear wavy boundary.

Cr—15 to 19 inches; highly decomposed gneiss bedrock.

R—19 inches; hard gneiss bedrock.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 8 inches and the lithic contact.

*Mollic epipedon thickness:* 7 to 8 inches

*Depth to bedrock:* 10 to 20 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 3 percent boulders; 0 to 5 percent stones; 10 to 20 percent cobbles; 5 to 30 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3, 4, or 6

Texture: Sandy loam, coarse sandy loam, or sandy clay loam

Clay content: 10 to 22 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 0 to 20 percent cobbles; 35 to 60 percent pebbles

Reaction: pH 6.1 to 7.3

### 487E—Catgulch, bouldery-Rock outcrop complex, 8 to 35 percent slopes

#### Setting

*Landform:* Hills

*Slope:* 8 to 35 percent

*Elevation:* 4,850 to 6,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Catgulch and similar soils: 70 percent

Rock outcrop: 20 percent

##### Minor Components

Bielenberg sandy clay loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

#### Major Component Description

##### Catgulch

*Surface layer texture:* Very cobbly coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 1.1 inches

### **Rock outcrop**

*Definition:* Exposures of gneiss or schist bedrock.

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

### **Management**

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

## **654E—Catgulch, very stony-Bielenberg-Rock outcrop complex, 15 to 45 percent slopes**

### **Setting**

*Landform:*

- Catgulch—Hills
- Bielenberg—Hills
- Rock outcrop—Hills

*Slope:*

- Catgulch—15 to 45 percent
- Bielenberg—15 to 45 percent

*Elevation:* 4,900 to 6,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### **Composition**

#### **Major Components**

Catgulch and similar soils: 60 percent

Bielenberg and similar soils: 15 percent

Rock outcrop: 10 percent

#### **Minor Components**

Breton coarse sandy loam: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 5 percent

### **Major Component Description**

#### **Catgulch**

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

#### **Bielenberg**

*Surface layer texture:* Sandy clay loam

*Depth class:* Deep (40 to 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

### **Rock outcrop**

*Definition:* Exposures of gneiss or schist bedrock.

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

### **Management**

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

## **654G—Catgulch, very stony-Rock outcrop complex, 55 to 75 percent slopes**

### **Setting**

*Landform:*

- Catgulch—Hills
- Rock outcrop—Hills

*Slope:* 55 to 75 percent

*Elevation:* 4,350 to 6,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### **Composition**

#### **Major Components**

Catgulch and similar soils: 70 percent

Rock outcrop: 15 percent

#### **Minor Components**

Bielenberg sandy loam: 0 to 10 percent

Breton coarse sandy loam: 0 to 5 percent

### **Major Component Description**

#### **Catgulch**

*Surface layer texture:* Very cobbly coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

#### **Rock outcrop**

*Definition:* Exposures of gneiss or schist bedrock.

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

### Management

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

### 787F—Catgulch, very stony-Spanpeak, stony-Bavdark complex, 25 to 60 percent slopes

#### Setting

*Landform:*

- Catgulch—Hills, south aspects
- Spanpeak—Hills, north aspects
- Bavdark—Hills

*Slope:*

- Catgulch—35 to 60 percent
- Spanpeak—35 to 60 percent
- Bavdark—25 to 45 percent

*Elevation:* 5,200 to 7,150 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

#### Composition

##### Major Components

Catgulch and similar soils: 45 percent

Spanpeak and similar soils: 30 percent

Bavdark and similar soils: 15 percent

##### Minor Components

Rock outcrop: 0 to 5 percent

Soils with slopes more than 60 percent: 0 to 5 percent

#### Major Component Description

##### Catgulch

*Surface layer texture:* Very cobbly coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

##### Spanpeak

*Surface layer texture:* Cobbly coarse sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

##### Bavdark

*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 8.1 inches

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

### Management

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

### Chinook Series

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

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Alluvial fans, stream terraces, relict stream terraces, and escarpments

*Parent material:* Alluvium

*Slope range:* 0 to 35 percent

*Elevation range:* 3,950 to 5,100 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

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

#### Typical Pedon

Chinook fine sandy loam, 4 to 8 percent slopes, in an area of cropland, 600 feet north and 1,200 feet west of the southeast corner of sec. 11, T. 1 S., R. 2 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, very dark brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many fine roots; slightly alkaline; abrupt smooth boundary.

Bw1—4 to 12 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly alkaline; clear smooth boundary.

Bw2—12 to 22 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky, and nonplastic; many very fine and fine roots; neutral; clear wavy boundary.

Bk1—22 to 36 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; weak fine

subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine roots; few fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—36 to 60 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; few fine threads and seams of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 12 to 35 inches

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bw horizons

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bk horizons

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 3 to 15 percent

Reaction: pH 7.4 to 8.4

### 38B—Chinook fine sandy loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 0 to 4 percent

*Elevation:* 3,950 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Chinook and similar soils: 90 percent

#### Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly 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:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

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

### Management

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

### 38E—Chinook fine sandy loam, 15 to 35 percent slopes

#### Setting

*Landform:* Escarpments

*Slope:* 15 to 35 percent

*Elevation:* 4,050 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Chinook and similar soils: 85 percent

#### Minor Components

Cabbart loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Trimad cobbly sandy loam: 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:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

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

### Management

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

## 38C—Chinook fine sandy loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 4 to 8 percent

*Elevation:* 4,050 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Chinook and similar soils: 90 percent

#### Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly 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:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

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

### Management

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

## 38D—Chinook fine sandy loam, 8 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 4,100 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Chinook and similar soils: 90 percent

#### Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly 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:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

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

### Management

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

## 438D—Chinook-Kalsted sandy loams, 8 to 15 percent slopes

### Setting

*Landform:*

- Chinook—Alluvial fans and stream terraces
- Kalsted—Alluvial fans and stream terraces

*Slope:*

- Chinook—8 to 15 percent
- Kalsted—8 to 15 percent

*Elevation:* 3,950 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Chinook and similar soils: 60 percent

Kalsted and similar soils: 25 percent

#### Minor Components

Crago cobbly loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Chinook

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

### **Kalsted**

*Surface layer texture:* Sandy 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 6.9 inches

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

### **Management**

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

### **Clarkstone Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Relict stream terraces  
*Parent material:* Loess  
*Slope range:* 0 to 15 percent  
*Elevation range:* 3,950 to 5,100 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 43 to 45 degrees F  
*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Torriorthentic Haplustolls

### **Typical Pedon**

Clarkstone silt loam, 0 to 4 percent slopes, in an area of cropland, 2,300 feet south and 1,500 feet east of the northwest corner of sec. 33, T. 4 N., R. 3 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly alkaline; clear smooth boundary.

Bw—7 to 9 inches; brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure;

soft, very friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; slightly alkaline; clear smooth boundary.

Bk1—9 to 22 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime, disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—22 to 27 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft very friable, slightly sticky, and nonplastic; few very fine roots; few fine masses of lime, disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

BC—27 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; disseminated lime; violently effervescent; moderately alkaline.

### **Range in Characteristics**

*Soil temperature:* 45 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 9 inches  
*Depth to the Bk horizon:* 7 to 9 inches

#### *Ap horizon*

Value: 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 20 percent  
 Reaction: pH 6.6 to 7.8

#### *Bw horizon*

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 20 percent  
 Reaction: pH 7.4 to 8.4

#### *Bk horizons*

Value: 6 or 7 dry; 4, 5, or 6 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 18 percent  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 8.4

#### *BC horizon*

Value: 6 or 7 dry; 4, 5, or 6 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 18 percent  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.9 to 8.4

## 18B—Clarkstone silt loam, 0 to 4 percent slopes

### Setting

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 3,950 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Clarkstone and similar soils: 90 percent

#### Minor Components

Brocko silt loam: 0 to 5 percent  
 Kalsted 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

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

### Management

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

## 18C—Clarkstone silt loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,000 to 4,850 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Clarkstone and similar soils: 85 percent

#### Minor Components

Brocko silt loam: 0 to 5 percent  
 Kalsted sandy loam: 0 to 5 percent  
 Soils with slopes more 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

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

## Management

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

## Clasoil Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate above the BC horizon and moderately rapid in the BC horizon  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 2 to 15 percent  
*Elevation range:* 4,500 to 5,550 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

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

## Typical Pedon

Clasoil cobbly sandy loam, 2 to 6 percent slopes, in an area of cropland, 600 feet north and 1,800 feet east of the southwest corner of sec. 6, T. 1 S., R. 6 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.  
 Bt1—7 to 12 inches; brown, (10YR 4/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt2—12 to 22 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt3—22 to 28 inches; brown (10YR 4/3) gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common distinct clay films on faces of peds; 5 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

BC—28 to 60 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; loose, nonsticky, and nonplastic; 10 percent cobbles and 35 percent pebbles, slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy loam or loam

Clay content: 12 to 20 percent

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

Reaction: pH 6.6 to 7.3

#### Bt horizons

Hue: 10YR or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Sandy clay loam, clay loam, or loam

Clay content: 18 to 30 percent

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

Reaction: pH 6.6 to 7.3

#### BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Sandy loam, loam, or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 40 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.1 to 7.8

## 254B—Clasoil cobbly sandy loam, 2 to 6 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 6 percent

*Elevation:* 4,500 to 5,050 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Clasoil and similar soils: 90 percent

#### Minor Components

Clasoil loam: 0 to 5 percent

Sawicki very cobbly loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly 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 6.2 inches

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

### Management

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

## 54C—Clasoil loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,700 to 5,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Clasoil and similar soils: 85 percent

#### Minor Components

Breton loam: 0 to 5 percent

Sawicki cobbly loam: 0 to 5 percent

Clasoil cobbly sandy loam: 0 to 3 percent

Soils with slopes more than 8 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

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

### Management

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

## 54D—Clasoil loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,500 to 5,550 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Clasoil and similar soils: 85 percent

#### Minor Components

Breton loam: 0 to 5 percent  
 Sawicki cobbly loam: 0 to 5 percent  
 Clasoil cobbly sandy loam: 0 to 3 percent  
 Soils with slopes more than 15 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

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

### Management

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

### Copenhaver Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Mountains and hills  
*Parent material:* Interbedded sandstone and shale residuum or sandstone residuum  
*Slope range:* 4 to 60 percent  
*Elevation range:* 4,950 to 8,000 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

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

### Typical Pedon

Copenhaver flaggy loam, in an area of Bangtail-Copenhaver complex, 8 to 25 percent slopes, in an area of rangeland, 1,900 feet north and 2,000 feet east of the southwest corner of sec. 27, T. 5 N., R. 7 E.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) flaggy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many very fine and fine pores; 15 percent flagstones and 15 percent channers; slightly acid; abrupt smooth boundary.

Bt1—7 to 11 inches; brown (10YR 4/3) very flaggy sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 20 percent channers; slightly acid; gradual smooth boundary.

Bt2—11 to 15 inches; brown (10YR 5/3) very flaggy sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct clay films on faces of peds and lining pores; 25 percent flagstones and 25 percent channers; slightly acid; gradual smooth boundary.

R—15 inches; hard sandstone.

### Range in Characteristics

*Soil temperature:* 36 to 40 degree F  
*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to bedrock:* 10 to 20 inches

*A horizon*

Hue: 10YR, 7.5YR, or 5YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 0 to 30 percent cobbles or flagstones; 15 to 30 percent pebbles or channers

Reaction: pH 6.1 to 7.3

*Bt horizons*

Hue: 10YR, 7.5YR, or 5YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 6

Texture: Sandy clay loam or clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles or flagstones; 20 to 50 percent pebbles or channers

Reaction: pH 6.1 to 7.8

**178F—Copenhaver flaggy loam,  
35 to 60 percent slopes**

**Setting**

*Landform:* Hills

*Slope:* 35 to 60 percent

*Elevation:* 5,050 to 7,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Copenhaver and similar soils: 85 percent

**Minor Components**

Copenhaver extremely stony loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

Rubble land: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

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

**Management**

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

**178E—Copenhaver-Rock outcrop  
complex, 8 to 35 percent slopes**

**Setting**

*Landform:*

- Copenhaver—Hills
- Rock outcrop—Hills

*Slope:* 8 to 35 percent

*Elevation:* 5,850 to 7,300 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Copenhaver and similar soils: 70 percent

Rock outcrop: 20 percent

**Minor Components**

Bangtail loam: 0 to 8 percent

Rubble land: 0 to 2 percent

**Major Component Description**

**Copenhaver**

*Surface layer texture:* Flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

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

**Management**

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

**Corbly Series**

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

*Drainage class:* Well drained

*Permeability:* Rapid

*Landform:* Stream terraces, alluvial fans, and outwash plains

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Elevation range:* 4,300 to 5,400 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Entic Haplustolls

**Typical Pedon**

Corbly very gravelly sandy loam, 0 to 4 percent slopes, in an area of rangeland, 1,800 feet south and 1,600 feet east of the northwest corner of sec. 27, T. 1 N., R. 5 E.

A—0 to 5 inches; brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, slightly sticky, and nonplastic; common very fine and fine and few medium roots; 5 percent cobbles and 40 percent pebbles; slightly alkaline; gradual smooth boundary.

AC—5 to 12 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 40 percent pebbles; slightly alkaline; gradual smooth boundary.

Ck1—12 to 22 inches; light yellowish brown (10YR 6/4) extremely gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine, fine, and medium roots; 15 percent cobbles and 50 percent pebbles; strongly effervescent; moderately alkaline; diffuse smooth boundary.

Ck2—22 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 60 percent pebbles; strongly effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 12 and 35 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to the Ck horizon:* 7 to 12 inches

**A horizon**

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy loam or loam

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 55 percent—0 to 10 percent stones; 5 to 15 percent cobbles; 10 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

**AC horizon**

Chroma: 2 or 3

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 10 to 20 percent

Content of rock fragments: 25 to 60 percent—5 to 20 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

*Note:* Some pedons contain a Bw horizon that does not extend to a depth of 10 inches

**Ck horizons**

Value: 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loamy sand, loamy coarse sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—15 to 25 percent cobbles; 25 to 60 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

**259B—Corbly very gravelly sandy loam, 0 to 4 percent slopes****Setting**

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,350 to 5,350 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Corbly and similar soils: 85 percent

**Minor Components**

Corbly very cobbly loam: 0 to 10 percent  
 Corbly very stony loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Very gravelly 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 2.4 inches

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

**Management**

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

**359C—Corbly very gravelly sandy loam, 4 to 8 percent slopes, stony****Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,850 to 5,400 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Corbly and similar soils: 90 percent

**Minor Components**

Channeled areas: 0 to 5 percent  
 Windham very stony loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Very gravelly 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 2.6 inches

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

**Management**

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

**Cowood Series**

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains and hills  
*Parent material:* Sandstone residuum, interbedded sandstone and shale residuum, or gneiss or schist residuum  
*Slope range:* 15 to 75 percent  
*Elevation range:* 5,000 to 8,400 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

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

**Typical Pedon**

Cowood channery loam, 15 to 45 percent slopes, very stony, in an area of forest land, 150 feet south and 1,300 feet east of the northwest corner of sec. 30, T. 5 N., R. 5 E.

Oi—0 to 1 inch; root mat and undecomposed forest litter.

E—1 to 5 inches; grayish brown (10YR 5/2) channery loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent flagstones and 15 percent channers; slightly acid; clear smooth boundary.

Bw—5 to 17 inches; pale brown (10YR 6/3) very flaggy coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, and nonplastic; common fine and few medium roots; 30 percent flagstones and 20 percent channers; slightly acid; abrupt wavy boundary.

R—17 inches; hard quartzite.

**Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to bedrock:* 10 to 20 inches

**E horizon**

Value: 5 or 6 dry; 2, 3, 4, or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 10 to 22 percent

Content of rock fragments: 25 to 60 percent—0 to 5 percent stones; 10 to 20 percent cobbles or flagstones; 15 to 35 percent pebbles or channers

Reaction: pH 5.1 to 6.5

#### *Bw horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Loam or coarse sandy loam

Clay content: 10 to 22 percent

Content of rock fragments: 50 to 80 percent—20 to 40 percent cobbles or flagstones; 20 to 40 percent pebbles or channers

Reaction: pH 5.1 to 6.5

### **993E—Cowood channery loam, 15 to 45 percent slopes, very stony**

#### **Setting**

*Landform:* Hills

*Slope:* 15 to 45 percent

*Elevation:* 6,000 to 7,000 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Cowood and similar soils: 90 percent

##### **Minor Components**

Cowood extremely stony loam: 0 to 5 percent

Rocko stony loam: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

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

#### **Management**

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

#### ***Crago Series***

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Relict stream terraces, escarpments, and hills

*Parent material:* Alluvium, colluvium, or limestone colluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 3,950 to 5,750 feet

*Annual precipitation:* 10 to 16 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid Aridic Calcustepts

#### **Typical Pedon**

Crago cobbly loam, in an area of Crago-Musselshell complex, 0 to 4 percent slopes, in an area of cropland, 1,500 feet north and 1,500 feet west of the southeast corner of sec. 30, T. 1 N., R. 2 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) cobbly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—6 to 18 inches; white (10YR 8/2) very cobbly loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; common very fine roots; 25 percent cobbles and 20 percent pebbles; common pieces of fractured petrocalcic material; prominent lime casts and pendants on rock fragments; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—18 to 60 inches; white (10YR 8/2) very cobbly sandy loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; few very fine roots; 25 percent cobbles and 30 percent pebbles; many pieces of fractured petrocalcic material; prominent lime casts and pendants of cemented sand and small pebbles on undersides of rock fragments; violently effervescent; moderately alkaline.

#### **Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 4 to 6 inches

**Ap horizon**

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 4, 5, or 6 dry; 3, 4, or 5 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 27 percent  
 Content of rock fragments: 15 to 40 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 5 to 25 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

**Bk horizons**

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or sandy loam  
 Clay content: 15 to 30 percent  
 Content of rock fragments: 35 to 75 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles  
 Calcium carbonate equivalent: 40 to 50 percent  
 Reaction: pH 7.9 to 8.4

**930F—Crago, stony-Quigley-  
 Rock outcrop complex  
 25 to 60 percent slopes**

**Setting***Landform:*

- Crago—Hills
- Quigley—Hills
- Rock outcrop—Hills

*Slope:*

- Crago—25 to 60 percent
- Quigley—25 to 60 percent

*Elevation:* 4,450 to 5,000 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Crago and similar soils: 50 percent  
 Quigley and similar soils: 30 percent  
 Rock outcrop: 10 percent

**Minor Components**

Musselshell loam: 0 to 5 percent  
 Pensore stony loam: 0 to 5 percent

**Major Component Description****Crago**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

**Quigley**

*Surface layer texture:* Silt loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.0 inches

**Rock outcrop**

*Definition:* Exposures of limestone bedrock.

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

**Management**

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

**430E—Crago-Beanlake complex,  
 15 to 35 percent slopes**

**Setting***Landform:*

- Crago—Escarpments, south aspects
- Beanlake—Escarpments, north aspects

*Slope:*

- Crago—15 to 35 percent
- Beanlake—15 to 35 percent

*Elevation:* 4,600 to 5,200 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Crago and similar soils: 50 percent  
 Beanlake and similar soils: 40 percent

**Minor Components**

Musselshell loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 5 percent

**Major Component Description****Crago**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

### **Beanlake**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

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

### **Management**

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

## **734B—Crago-Musselshell complex, 0 to 4 percent slopes**

### **Setting**

*Landform:*

- Crago—Relict stream terraces
- Musselshell—Relict stream terraces

*Slope:*

- Crago—0 to 4 percent
- Musselshell—0 to 4 percent

*Elevation:* 4,150 to 5,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### **Composition**

#### **Major Components**

Crago and similar soils: 60 percent

Musselshell and similar soils: 25 percent

#### **Minor Components**

Crago very cobbly loam: 0 to 5 percent

Soils that have a petrocalcic horizon at 10 to 20 inches: 0 to 10 percent

### **Major Component Description**

#### **Crago**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

### **Musselshell**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.6 inches

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

### **Management**

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

## **734C—Crago-Musselshell complex, 4 to 8 percent slopes**

### **Setting**

*Landform:*

- Crago—Relict stream terraces
- Musselshell—Relict stream terraces

*Slope:*

- Crago—4 to 8 percent
- Musselshell—4 to 8 percent

*Elevation:* 4,100 to 5,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### **Composition**

#### **Major Components**

Crago and similar soils: 60 percent

Musselshell and similar soils: 25 percent

#### **Minor Components**

Soils that have a petrocalcic horizon at 10 to 20 inches: 0 to 10 percent

Crago very cobbly loam: 0 to 5 percent

### **Major Component Description**

#### **Crago**

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

#### **Musselshell**

*Surface layer texture:* Loam

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

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

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

### Management

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

## 734D—Crago-Musselshell complex, 8 to 15 percent slopes

### Setting

*Landform:*  
 • Crago—Relict stream terraces  
 • Musselshell—Relict stream terraces

*Slope:*  
 • Crago—8 to 15 percent  
 • Musselshell—8 to 15 percent  
*Elevation:* 4,100 to 5,500 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Crago and similar soils: 65 percent  
 Musselshell and similar soils: 20 percent

#### Minor Components

Crago very cobbly loam: 0 to 10 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Crago

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.7 inches

#### Musselshell

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

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

### Management

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

## 730C—Crago-Pensore gravelly loams, 4 to 15 percent slopes

### Setting

*Landform:*  
 • Crago—Hills  
 • Pensore—Hills  
*Slope:*  
 • Crago—4 to 15 percent  
 • Pensore—4 to 15 percent  
*Elevation:* 4,050 to 5,700 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Crago and similar soils: 50 percent  
 Pensore and similar soils: 35 percent

#### Minor Components

Crago stony loam: 0 to 5 percent  
 Rock outcrop: 0 to 5 percent  
 Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

### Major Component Description

#### Crago

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.3 inches

#### Pensore

*Surface layer texture:* Gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.5 inches

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

### Management

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

### 730E—Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Crago—Hills
- Pensore—Hills
- Rock outcrop—Hills

*Slope:*

- Crago—15 to 45 percent
- Pensore—15 to 45 percent

*Elevation:* 3,950 to 5,750 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Crago and similar soils: 40 percent  
Pensore and similar soils: 30 percent  
Rock outcrop: 15 percent

##### Minor Components

Crago stony loam: 0 to 5 percent  
Musselshell loam: 0 to 5 percent  
Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

#### Major Component Description

##### Crago

*Surface layer texture:* Gravelly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.3 inches

##### Pensore

*Surface layer texture:* Gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.5 inches

##### Rock outcrop

*Definition:* Exposures of limestone bedrock.

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

### Management

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

### 630E—Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes, very stony

#### Setting

*Landform:*

- Crago—Hills
- Pensore—Hills
- Rock outcrop—Hills

*Slope:*

- Crago—15 to 45 percent
- Pensore—15 to 45 percent

*Elevation:* 4,150 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Crago and similar soils: 60 percent  
Pensore and similar soils: 20 percent  
Rock outcrop: 10 percent

##### Minor Components

Musselshell loam: 0 to 5 percent  
Soils with slopes more than 45 percent: 0 to 3 percent  
Crago bouldery loam: 0 to 2 percent

#### Major Component Description

##### Crago

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

##### Pensore

*Surface layer texture:* Very cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

**Rock outcrop**

*Definition:* Exposures of limestone bedrock.

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

**Management**

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

**830E—Crago-Scravo complex,  
15 to 45 percent slopes****Setting**

*Landform:*

- Crago—Escarpments
- Scravo—Escarpments

*Slope:*

- Crago—15 to 45 percent
- Scravo—15 to 45 percent

*Elevation:* 4,100 to 5,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Crago and similar soils: 50 percent  
Scravo and similar soils: 40 percent

**Minor Components**

Udecide sandy clay loam: 0 to 5 percent  
Blacksheep sandy loam: 0 to 3 percent  
Rock outcrop: 0 to 2 percent

**Major Component Description****Crago**

*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 1.9 inches

**Scravo**

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.1 inches

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

**Management**

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

**Danaher Series**

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

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains

*Parent material:* Sandstone colluvium

*Slope range:* 8 to 45 percent

*Elevation range:* 5,300 to 7,100 feet

*Annual precipitation:* 25 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

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

**Typical Pedon**

Danaher loam, in an area of Danaher, stony-Loberg, very stony complex 15 to 45 percent slopes, in an area of forest land, 2,200 feet south and 2,200 feet west of the northeast corner of sec. 2, T. 3 S., R. 6 E.

Oi—0 to 3 inches; slightly decomposed needles and twigs.

E—3 to 8 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 3 percent stones, 5 percent cobbles, and 5 percent pebbles; moderately acid; clear smooth boundary.

E/Bt—8 to 13 inches; E part (80 percent) light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist, B part (20 percent) light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent stones, 5 percent cobbles, and 5 percent pebbles; strongly acid; clear smooth boundary.

Bt1—13 to 29 inches; very pale brown (10YR 7/3) gravelly clay, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; many distinct clay films on faces of peds and lining pores; common very fine and fine roots; 5 percent

stones, 5 percent cobbles, and 15 percent pebbles; strongly acid; clear wavy boundary.

Bt2—29 to 60 inches; light yellowish brown (10YR 6/4) cobbly clay, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine roots; many distinct clay films on faces of pedes and lining pores; 5 percent stones, 15 percent cobbles, and 10 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

#### *E horizon*

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

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

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 1 to 25 percent—1 to 3 percent stones; 0 to 10 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 5.6 to 7.3

#### *E/Bt horizon*

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

Value: E part 6 or 7 dry; 4 or 5 moist; Bt part 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 5.1 to 7.3

#### *Bt horizons*

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

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

Chroma: 3, 4, or 6

Clay content: 35 to 50 percent

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

Reaction: pH 5.1 to 7.3

## 792E—Danaher, stony-Loberg, very stony complex, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Danaher—Mountains
- Loberg—Mountains

#### *Slope:*

- Danaher—15 to 45 percent
- Loberg—15 to 45 percent

*Elevation:* 5,450 to 7,100 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Danaher and similar soils: 70 percent

Loberg and similar soils: 20 percent

#### Minor Components

Cowood very stony loam: 0 to 6 percent

Rock outcrop: 0 to 3 percent

Redlodge silty clay loam: 0 to 1 percent

### Major Component Description

#### Danaher

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

#### Loberg

*Surface layer texture:* Very flaggy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is 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—Danaher, stony-Loberg, very stony complex, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Danaher—Mountains
- Loberg—Mountains

*Slope:*

- Danaher—8 to 15 percent
- Loberg—8 to 15 percent

*Elevation:* 5,300 to 6,900 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Danaher and similar soils: 70 percent

Loberg and similar soils: 20 percent

**Minor Components**

Stemple stony sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 4 percent

Redlodge silty clay loam: 0 to 1 percent

**Major Component Description****Danaher***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 9.0 inches**Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches

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

**Management**

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

**Danvers Series***Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Relict stream terraces*Parent material:* Alluvium or loess*Slope range:* 0 to 15 percent*Elevation range:* 4,600 to 5,900 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

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

**Typical Pedon**

Danvers silty clay loam, 4 to 8 percent slopes, in an area of cropland, 2,900 feet north and 2,400 feet west of the southeast corner of sec. 25, T. 2 S., R. 3 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles; neutral; clear smooth boundary.

Bt1—4 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; many distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt2—7 to 16 inches; pale brown (10YR 6/3) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine roots; many distinct clay films on faces of peds; neutral; clear smooth boundary.

Bk—16 to 42 inches; light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine roots; 5 percent pebbles; common medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

2C—42 to 60 inches; light gray (10YR 7/2) gravelly clay loam, brown (10YR 5/3) moist; massive; slightly hard, friable, moderately sticky, and moderately plastic; strongly effervescent; 5 percent cobbles and 15 percent pebbles; moderately alkaline.

**Range in Characteristics***Soil temperature:* 41 to 45 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 7 to 12 inches*Depth to the Bk horizon:* 14 to 25 inches*Ap horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3  
 Texture: Clay loam or silty clay loam  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 20 percent—0 to 15 percent cobbles; 0 to 5 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Bt horizons**

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 4, 5, or 6 dry; 2, 3, or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Silty clay loam or silty clay  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 8.4

**Bk horizon**

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 6, 7, or 8 dry; 5 or 6 moist  
 Chroma: 1, 2, or 3  
 Texture: Clay loam or silty clay loam  
 Clay content: 27 to 40 percent  
 Content of rock fragments: 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 20 to 40 percent  
 Reaction: pH 7.4 to 8.4

**2C horizon**

Hue: 7.5YR, 10YR or 2.5Y  
 Value: 6 or 7 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Clay loam, sandy loam, or loam  
 Clay content: 10 to 35 percent  
 Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles  
 Reaction: pH 7.4 to 8.4

**258D—Danvers cobbly clay loam, 8 to 15 percent slopes****Setting**

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 5,050 to 5,900 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Danvers and similar soils: 90 percent

**Minor Components**

Shawmut very cobbly loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.1 inches

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

**Management**

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

**58B—Danvers silty clay loam, 0 to 4 percent slopes****Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,750 to 5,800 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Danvers and similar soils: 90 percent

**Minor Components**

Danvers cobbly clay loam: 0 to 5 percent  
 Tamaneen cobbly clay loam: 0 to 3 percent  
 Soils with slopes more than 4 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

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

**Management**

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

### 58C—Danvers silty clay loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,750 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Danvers and similar soils: 90 percent

##### Minor Components

Danvers cobbly clay loam: 0 to 5 percent  
Quagle silty loam: 0 to 3 percent  
Soils with slopes more than 8 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is 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—Danvers silty clay loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,750 to 5,600 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Danvers and similar soils: 90 percent

##### Minor Components

Danvers cobbly clay loam: 0 to 5 percent  
Quagle silty loam: 0 to 3 percent  
Soils with slopes more than 15 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

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

#### Management

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

### 458C—Danvers-Quagle complex, 4 to 8 percent slopes

#### Setting

*Landform:*

- Danvers—Relict stream terraces
- Quagle—Relict stream terraces

*Slope:*

- Danvers—4 to 8 percent
- Quagle—4 to 8 percent

*Elevation:* 4,700 to 5,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Danvers and similar soils: 70 percent  
Quagle and similar soils: 20 percent

##### Minor Components

Meagher cobbly loam: 0 to 5 percent  
Soils with slopes more than 8 percent: 0 to 5 percent

#### Major Component Description

##### Danvers

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

##### Quagle

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

*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

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

### Management

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

## 458D—Danvers-Quagle complex, 8 to 15 percent slopes

### Setting

*Landform:*

- Danvers—Relict stream terraces
- Quagle—Relict stream terraces

*Slope:*

- Danvers—8 to 15 percent
- Quagle—8 to 15 percent

*Elevation:* 4,600 to 5,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Danvers and similar soils: 70 percent  
 Quagle and similar soils: 20 percent

#### Minor Components

Meagher cobbly loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Danvers

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

#### Quagle

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

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

### Management

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

## DA—Denied access

### Composition

#### Major Components

Denied access: 100 percent

#### Major Component Description

*Definition:* Areas where mapping access was denied by the landowner.

### Doby Series

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

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 15 to 45 percent

*Elevation range:* 5,900 to 6,600 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Clayey, smectitic, shallow Ustic Haplocryolls

### Typical Pedon

Doby clay loam, in an area of Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes, in an area of rangeland, 300 feet north and 1,300 feet east of the southwest corner of sec. 2, T. 4 N., R. 7 E.

A—0 to 5 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; soft, friable, moderately sticky, and moderately plastic; many very fine and fine roots; many very fine and fine vesicular pores; 5 percent channers; neutral; abrupt smooth boundary.

Bw1—5 to 10 inches; grayish brown (2.5Y 5/2) clay, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; many very fine and fine roots; few very fine tubular pores; 5 percent channers; neutral; clear smooth boundary.

Bw2—10 to 15 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (10YR 4/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky, and very plastic; few fine and medium roots; few very fine vesicular pores; 10 percent channers; neutral; clear smooth boundary.

C—15 to 19 inches; light brownish gray (2.5Y 6/2) channery clay, dark gray (10YR 4/1) moist; weak coarse prismatic structure; hard, firm, very sticky, and very plastic; few fine and medium roots; 20 percent soft shale fragments; neutral; clear smooth boundary.

Cr—19 to 60 inches; gray (10YR 5/1) dark gray semiconsolidated shale (10YR 4/1) moist; few very fine and fine roots between shale fragments; strongly effervescent; moderately alkaline; common irregular coatings of lime on undersides of shale fragments.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

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

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent channers

Reaction: pH 6.6 to 7.3

#### Bw horizons

Hue: 10YR or 2.5Y

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

Chroma: 1, 2, 3, or 4

Clay content: 45 to 55 percent

Content of rock fragments: 0 to 20 percent channers

Reaction: pH 6.6 to 7.3

#### C horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 1 or 2

Clay content: 45 to 55 percent

Content of rock fragments: 0 to 20 percent channers

Reaction: pH 6.6 to 7.3

### Doughty Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Relict stream terraces and alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 4,850 to 6,300 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

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

### Typical Pedon

Doughty loam, 4 to 8 percent slopes, in an area of pasture, 1,320 feet north and 2,400 feet west of the southeast corner of sec. 28, T. 1 S., R. 6 E.

A—0 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine and fine roots; 5 percent cobbles and 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt—8 to 15 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—15 to 21 inches; grayish brown (10YR 5/2) gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common fine masses of lime; 5 percent cobbles and 20 percent pebbles; strongly effervescent, moderately alkaline; clear wavy boundary.

2Ck—21 to 60 inches; light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, moderately sticky, and moderately plastic; few very fine and fine roots; 10 percent cobbles and 40 percent pebbles; few fine masses of lime; violently effervescent, moderately alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 16 inches

*Depth to the Bk horizon:* 10 to 24 inches

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

*A horizon*

Value: 3 or 4 dry; 2 or 3 moist  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.1 to 7.8

*Bt horizon*

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Texture: Clay loam or silty clay loam  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.8

*Bk horizon*

Hue: 10YR  
 Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist  
 Chroma: 2 or 3  
 Texture: Clay loam or loam  
 Clay content: 18 to 32 percent  
 Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.4 to 8.4

*2Ck horizon*

Hue: 10YR  
 Value: 7 or 8 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Sandy clay loam, sandy loam, or loam  
 Clay content: 15 to 25 percent  
 Content of rock fragments: 40 to 75 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.9 to 8.4

### **272B—Doughty cobbly loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 5,300 to 6,300 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

##### **Major Components**

Doughty and similar soils: 90 percent

##### **Minor Components**

Shawmut very cobbly loam: 0 to 5 percent  
 Tamaneen cobbly loam: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

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

#### **Management**

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

### **272C—Doughty cobbly loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 5,150 to 6,100 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

##### **Major Components**

Doughty and similar soils: 90 percent

##### **Minor Components**

Shawmut very cobbly loam: 0 to 5 percent  
 Tamaneen cobbly loam: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

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

#### **Management**

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

### **272D—Doughty cobbly loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,950 to 6,300 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

#### **Major Components**

Doughty and similar soils: 90 percent

#### **Minor Components**

Shawmut very cobbly loam: 0 to 5 percent  
 Tamaneen cobbly loam: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.5 inches

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

#### **Management**

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

### **72C—Doughty loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 5,000 to 5,650 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

#### **Major Components**

Doughty and similar soils: 90 percent

#### **Minor Components**

Doughty cobbly loam: 0 to 5 percent  
 Anceney cobbly loam: 0 to 3 percent  
 Soils with slopes more than 8 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.8 inches

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

#### **Management**

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

### **72D—Doughty loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,850 to 5,300 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

#### **Major Components**

Doughty and similar soils: 90 percent

#### **Minor Components**

Doughty cobbly loam: 0 to 5 percent  
 Anceney cobbly loam: 0 to 3 percent  
 Soils with slopes more than 15 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.8 inches

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

#### **Management**

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

**Durston Series***Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Relict stream terraces and alluvial fans*Parent material:* Loess or reworked loess*Slope range:* 0 to 15 percent*Elevation range:* 4,850 to 6,000 feet*Annual precipitation:* 18 to 22 inches*Annual air temperature:* 37 to 41 degrees F*Frost-free period:* 80 to 95 days**Taxonomic Class:** Fine, mixed, superactive, frigid  
Typic Argiustolls**Typical Pedon**

Durston silty clay loam, 4 to 8 percent slopes, in an area of hayland, 2,000 feet south and 1,300 feet east of the northwest corner of sec. 27, T. 2 S., R. 6 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; slightly acid; clear smooth boundary.

Bt1—6 to 14 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist, weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; neutral; gradual smooth boundary.

Bt2—14 to 25 inches; yellowish brown (10YR 5/4) silty clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; slightly alkaline; clear smooth boundary.

Bk1—25 to 40 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine roots; many medium masses of lime; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—40 to 60 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; very hard, friable, moderately sticky, and slightly plastic; few very fine roots;

common medium masses of lime; strongly effervescent; slightly alkaline.

**Range in Characteristics***Soil temperature:* 39 to 43 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 8 to 15 inches*Depth to the Bk horizon:* 20 to 40 inches**Ap horizon**

Value: 3 or 4 dry; 2 or 3 moist

Texture: Silty clay loam or clay loam

Clay content: 27 to 35 percent

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

Reaction: pH 6.1 to 7.3

**Bt1 horizon**

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

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

Reaction: pH 6.1 to 7.3

**Bt2 horizon**

Value: 4 or 5 dry

Chroma: 3 or 4

Texture: Silty clay loam, silty clay, clay loam, or clay

Clay content: 35 to 50 percent

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

Reaction: pH 6.6 to 7.8

**Bk1 horizon**

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, silt loam, or clay loam

Clay content: 25 to 40 percent

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

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

**Bk2 horizon**

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

Chroma: 2, 3, or 4

Texture: Silty clay loam, silt loam, or clay loam

Clay content: 25 to 35 percent

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

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 8.4

### 858C—Durston cobbly clay loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 5,350 to 5,750 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Durston and similar soils: 90 percent

##### Minor Components

Durston very cobbly loam: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess or alluvium from loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.5 inches

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

#### Management

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

### 858D—Durston cobbly clay loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 5,350 to 5,600 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Durston and similar soils: 90 percent

##### Minor Components

Durston very cobbly loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess or alluvium from loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.5 inches

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

#### Management

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

### 658B—Durston silty clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 5,150 to 6,000 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Durston and similar soils: 90 percent

##### Minor Components

Doughty cobbly loam: 0 to 5 percent  
 Durston cobbly clay 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:* Loess or alluvium from loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

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

#### Management

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

### 658C—Durston silty clay loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 4,850 to 5,650 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Durston and similar soils: 90 percent

##### Minor Components

Doughty cobbly loam: 0 to 5 percent  
 Durston cobbly clay 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:* Loess or alluvium from loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

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

#### Management

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

### 658D—Durston silty clay loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,850 to 5,550 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Durston and similar soils: 90 percent

##### Minor Components

Doughty cobbly loam: 0 to 5 percent  
 Durston cobbly clay 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:* Loess or alluvium from loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

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

#### Management

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

#### *Emyd Series*

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Permeability:* Moderate above the 2C horizon and rapid below  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 3,950 to 4,200 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 43 to 45 degrees F  
*Frost-free period:* 100 to 120 days

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Oxyaquic Ustifluvents

#### Typical Pedon

Emyd loam, in an area of Rivra-Emyd-Greycliff complex, 0 to 2 percent slopes, protected, in an area of rangeland, 2,100 feet north and 1,600 feet east of the southwest corner of sec. 18, T. 3 N., R. 3 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

A2—3 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; strongly

effervescent; moderately alkaline; clear smooth boundary.

C1—9 to 23 inches; light brownish gray (10YR 6/2) loam consisting of strata of sandy loam, fine sandy loam and loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; strongly alkaline; abrupt smooth boundary.

2C2—23 to 60 inches; variegated very gravelly loamy sand; massive; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 40 percent pebbles; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches

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

*Depth to seasonal high water table:* 42 to 60 inches

*Note:* The A horizon will not meet the thickness requirements of a mollic epipedon.

#### A1 and A2 horizons

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

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.9 to 8.4

#### C1 horizon

Value: 4 or 5 moist; 6 or 7 dry

Texture: Loam consisting of fine stratification of sandy loam, fine sandy loam, and loamy sand with less than 50 percent fine or coarser sand

Clay content: 10 to 25 percent; averages less than 18 percent when mixed

Content of rock fragments: 0 to 10 percent pebbles

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 8.5 to 9.6

#### 2C2 horizon

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 75 percent—5 to 25 percent cobbles; 35 to 50 percent pebbles

Reaction: pH 7.9 to 8.4

### Enbar Series

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

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Elevation range:* 4,150 to 6,300 feet

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 80 to 110 days

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

### Typical Pedon

Enbar loam, in an area of Enbar-Nythar loams, 0 to 4 percent slopes, in an area of woodland, 1,000 feet north and 1,700 feet east of the southwest corner of sec. 1, T. 1 N., R. 5 E.

A1—0 to 12 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; strong very fine and fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine, fine, medium, and coarse roots; neutral; clear smooth boundary.

A2—12 to 22 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; neutral; clear smooth boundary.

Cg1—22 to 37 inches; dark gray (10YR 4/1) sandy loam, grayish brown (10YR 5/2) dry; common fine prominent strong brown (7.5YR 4/6) redox concentrations; weak medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly alkaline; gradual smooth boundary.

Cg2—37 to 49 inches; gray (10YR 5/1) sandy loam, light brownish gray (10YR 6/2) dry; many fine prominent strong brown (7.5YR 4/6) redox concentrations; massive; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly alkaline; clear smooth boundary.

2C—49 to 60 inches; gray (10YR 5/1) very gravelly loamy sand, light gray (10YR 6/1) dry; few fine prominent brownish yellow (10YR 6/6) redox concentrations; single grain; loose, nonsticky, and nonplastic; 5 percent cobbles and 45 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 16 to 28 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the 2C horizon:* 40 to 60 inches

#### *A horizons*

Hue: 5YR, 7.5YR, or 10YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 35 percent

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

Reaction: pH 6.6 to 7.8

#### *Cg horizons*

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 0, 1, or 2

Texture: Loam, sandy loam, silt loam, or silty clay loam

Clay content: 18 to 30 percent

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

Reaction: pH 7.4 to 8.4

#### *2C horizon*

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 1, 2, or 3

Texture: Loamy sand or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 35 to 75 percent—0 to 5 percent cobbles; 35 to 70 percent pebbles

Reaction: pH 7.4 to 8.4

### **522A—Enbar clay loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Flood plains

*Slope:* 0 to 2 percent

*Elevation:* 4,300 to 5,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Enbar and similar soils: 85 percent

##### **Minor Components**

Nythar loam: 0 to 5 percent

Straw loam: 0 to 5 percent

Sudworth silty clay loam: 0 to 5 percent

### **Major Component Description**

*Surface layer texture:* Clay loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.5 inches

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

#### **Management**

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

### **509B—Enbar loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Elevation:* 4,400 to 6,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Enbar and similar soils: 85 percent

##### **Minor Components**

Nythar loam: 0 to 10 percent

Straw loam: 0 to 5 percent

### **Major Component Description**

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.8 inches

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

#### **Management**

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

## 512D—Enbar-Bowery-Nythar complex, 4 to 15 percent slopes

### Setting

#### Landform:

- Enbar—Flood plains
- Bowery—Alluvial fans and stream terraces
- Nythar—Flood plains

#### Slope:

- Enbar—4 to 8 percent
- Bowery—4 to 15 percent
- Nythar—4 to 6 percent

*Elevation:* 4,450 to 6,300 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Enbar and similar soils: 55 percent

Bowery and similar soils: 20 percent

Nythar and similar soils: 15 percent

#### Minor Components

Blossberg loam: 0 to 5 percent

Straw loam: 0 to 5 percent

### Major Component Description

#### Enbar

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.8 inches

#### Bowery

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.2 inches

#### Nythar

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 9.7 inches

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

### Management

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

## 512B—Enbar-Nythar loams, 0 to 4 percent slopes

### Setting

#### Landform:

- Enbar—Flood plains
- Nythar—Flood plains

#### Slope:

- Enbar—0 to 4 percent
- Nythar—0 to 4 percent

*Elevation:* 4,300 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Enbar and similar soils: 60 percent

Nythar and similar soils: 30 percent

#### Minor Components

Blossberg loam: 0 to 5 percent

Straw loam: 0 to 5 percent

### Major Component Description

#### Enbar

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.8 inches

#### Nythar

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 9.7 inches

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

## Management

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

### 523A—Enbar-Nythar loams, cool, 0 to 4 percent slopes

#### Setting

##### Landform:

- Enbar—Flood plains
- Nythar—Flood plains

##### Slope:

- Enbar—0 to 4 percent
- Nythar—0 to 4 percent

*Elevation:* 4,150 to 6,100 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

#### Composition

##### Major Components

Enbar and similar soils: 70 percent

Nythar and similar soils: 20 percent

##### Minor Components

Sudworth loam: 0 to 5 percent

Straw loam: 0 to 3 percent

Blossberg loam: 0 to 2 percent

#### Major Component Description

##### Enbar

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 8.8 inches

##### Nythar

*Surface layer texture:* Loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 9.7 inches

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

## Management

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

### Fairway Series

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

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate above the 2Cg horizon and rapid in the 2Cg horizon

*Landform:* Flood plains and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,950 to 6,000 feet

*Annual precipitation:* 10 to 19 inches

*Annual air temperature:* 39 to 45 degrees F

*Frost-free period:* 90 to 115 days

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

#### Typical Pedon

Fairway loam, in an area of Ryell-Rivra-Fairway complex, 0 to 2 percent slopes, in an area of cropland, 1,700 feet north and 100 feet west of the southeast corner of sec. 26, T. 1 N., R. 1 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

A2—7 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and slightly plastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

A3—13 to 15 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and slightly plastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C—15 to 28 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Cg1—28 to 34 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; few fine distinct

brownish yellow (10YR 6/6) redox concentrations; massive; hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly effervescent; moderately alkaline; clear wavy boundary.

Cg<sub>2</sub>—34 to 46 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; few fine distinct brownish yellow (10YR 6/6) redox concentrations; massive, slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly effervescent; moderately alkaline; diffuse wavy boundary.

2Cg—46 to 60 inches; light gray (10YR 7/2) sand, dark grayish brown (10YR 4/2) moist; few fine distinct brownish yellow (10YR 6/6) redox concentrations; loose, nonsticky, and nonplastic; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the 2C horizon:* 40 inches or more

#### A horizons

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Texture: Loam, silt loam, silty clay loam, or clay loam

Clay content: 15 to 35 percent

Calcium carbonate equivalent: 2 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 7.4 to 8.4

#### C and Cg horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam; some with thin strata of sandy loam and clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.4 to 8.4

#### 2Cg horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 6 or 7 dry

Chroma: 1 or 2

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 60 percent—0 to 5 percent cobbles; 0 to 55 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 6.6 to 7.8

### 511A—Fairway silt loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,100 to 4,950 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Fairway and similar soils: 85 percent

##### Minor Components

Blossberg loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 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:* None

*Water table:* Apparent

*Available water capacity:* Mainly 9.1 inches

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

#### Management

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

### 524A—Fairway-Bonebasin complex, 0 to 2 percent slopes

#### Setting

*Landform:*

- Fairway—Flood plains
- Bonebasin—Stream terraces

*Slope:*

- Fairway—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 5,300 to 6,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Fairway and similar soils: 70 percent  
Bonebasin and similar soils: 20 percent

### Minor Components

Blossberg loam: 0 to 5 percent  
Soapcreek silty clay loam: 0 to 5 percent

## Major Component Description

### Fairway

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 8.6 inches

### Bonebasin

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.0 inches

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

## Management

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

### 505A—Fairway-Rivra complex, 0 to 2 percent slopes

## Setting

#### *Landform:*

- Fairway—Flood plains
- Rivra—Flood plains

#### *Slope:*

- Fairway—0 to 2 percent
- Rivra—0 to 2 percent

*Elevation:* 3,950 to 4,600 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Fairway and similar soils: 60 percent  
Rivra and similar soils: 25 percent

### Minor Components

Bonebasin loam: 0 to 5 percent  
Meadowcreek silty clay loam: 0 to 5 percent  
Ryell sandy loam: 0 to 5 percent

## Major Component Description

### Fairway

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Available water capacity:* Mainly 8.1 inches

### Rivra

*Surface layer texture:* Cobbly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.0 inches

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

## Management

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

### 508A—Fairway-Threeriv-Rivra complex, 0 to 2 percent slopes

## Setting

#### *Landform:*

- Fairway—Flood plains
- Threeriv—Flood plains
- Rivra—Flood plains

#### *Slope:*

- Fairway—0 to 2 percent
- Threeriv—0 to 2 percent
- Rivra—0 to 2 percent

*Elevation:* 4,000 to 4,900 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Fairway and similar soils: 50 percent

Threeriv and similar soils: 20 percent

Rivra and similar soils: 15 percent

#### Minor Components

Lamoose loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

### Major Component Description

#### Fairway

*Surface layer texture:* Silty clay loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 8.1 inches

#### Threeriv

*Surface layer texture:* Silty clay loam

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

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Occasional

*Water table:* Apparent

*Available water capacity:* Mainly 5.4 inches

#### Rivra

*Surface layer texture:* Cobbly sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 2.0 inches

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

### Management

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

### Farnuf Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and sedimentary plains

*Parent material:* Alluvium or colluvium

*Slope range:* 2 to 15 percent

*Elevation range:* 4,650 to 6,100 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 37 to 43 degrees F

*Frost-free period:* 90 to 110 days

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

### Typical Pedon

Farnuf loam, in an area of Farnuf-Absarokee-Tolbert complex, 8 to 15 percent slopes, in an area of cropland, 200 feet south and 1,300 feet west of the northeast corner, sec. 36, T. 3 N., R. 7 E.

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

Bt1—4 to 8 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; many very fine and few fine and medium roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt2—8 to 16 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt3—16 to 25 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

**Bk1**—25 to 36 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine roots; common fine masses of lime; strongly effervescent; slightly alkaline; gradual smooth boundary.

**Bk2**—36 to 60 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 10 to 25 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

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

Reaction: pH 6.1 to 7.8

#### Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, 5, or 6 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 25 to 35 percent

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

Reaction: pH 6.1 to 7.8

#### Bk horizons

Hue: 7.5Y, 10YR, or 2.5Y

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

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or clay loam

Clay content: 15 to 30 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

Reaction: pH 7.4 to 8.4

## 768C—Farnuf-Absarokee complex, 4 to 8 percent slopes

### Setting

#### Landform:

- Farnuf—Sedimentary plains
- Absarokee—Sedimentary plains

#### Slope:

- Farnuf—4 to 8 percent
- Absarokee—4 to 8 percent

*Elevation:* 5,200 to 5,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Farnuf and similar soils: 55 percent

Absarokee and similar soils: 30 percent

#### Minor Components

Soils with slopes more than 8 percent: 0 to 8 percent

Tolbert channery loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Farnuf

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

#### Absarokee

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

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

### Management

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

## 768D—Farnuf-Absarokee-Tolbert complex, 8 to 15 percent slopes

### Setting

#### Landform:

- Farnuf—Hills
- Absarokee—Hills
- Tolbert—Hills

#### Slope:

- Farnuf—8 to 15 percent
- Absarokee—8 to 15 percent
- Tolbert—8 to 15 percent

*Elevation:* 4,650 to 6,050 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Farnuf and similar soils: 50 percent

Absarokee and similar soils: 30 percent

Tolbert and similar soils: 10 percent

#### Minor Components

Work clay loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Farnuf

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

#### Absarokee

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

#### Tolbert

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

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

### Management

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

## 668C—Farnuf-Absarook-Tolbert complex, 2 to 8 percent slopes

### Setting

#### Landform:

- Farnuf—Sedimentary plains
- Absarook—Sedimentary plains
- Tolbert—Sedimentary plains

#### Slope:

- Farnuf—2 to 8 percent
- Absarook—2 to 8 percent
- Tolbert—2 to 8 percent

*Elevation:* 5,400 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Farnuf and similar soils: 60 percent

Absarook and similar soils: 20 percent

Tolbert and similar soils: 5 percent

#### Minor Components

Absarokee clay loam: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Farnuf

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.0 inches

### **Absarook**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

### **Tolbert**

*Surface layer texture:* Channery loam

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

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

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

## **Management**

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

## **Farside Series**

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

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium derived from gneiss, schist, or sandstone

*Slope range:* 2 to 15 percent

*Elevation range:* 4,900 to 6,150 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

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

## **Typical Pedon**

Farside loam, 2 to 6 percent slopes, in an area of cropland, 1,300 feet south and 900 feet west of the northeast corner of sec. 11, T. 3 S., R. 5 E.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—11 to 14 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; common very fine and few medium roots; common distinct clay films on faces of pedes and lining pores; 5 percent pebbles; neutral; clear smooth boundary.

Bt2—14 to 31 inches; dark brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; common very fine roots; common distinct clay films on faces of pedes and lining pores; 10 percent pebbles; neutral; clear smooth boundary.

C—31 to 60 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky, and nonplastic; few very fine roots; 5 percent cobbles and 20 percent pebbles; neutral.

## **Range in Characteristics**

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

### *A horizon*

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 18 to 27 percent

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

Reaction: pH 6.1 to 7.3

### *Bt horizons*

Value: 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 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

### *C horizon*

Value: 4 or 5 dry

Chroma: 3, 4, 5, or 6

Texture: Sandy loam or coarse sandy loam  
 Clay content: 5 to 18 percent  
 Content of rock fragments: 15 to 45 percent—5 to 20 percent cobbles; 10 to 25 percent pebbles  
 Reaction: pH 6.1 to 7.3  
*Note:* This horizon may contain thin strata of sandy clay loam.

### **354B—Farside loam, 2 to 6 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 6 percent  
*Elevation:* 5,000 to 5,700 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

##### **Major Components**

Farside and similar soils: 90 percent

##### **Minor Components**

Sawicki cobbly loam: 0 to 6 percent  
 Breeton sandy loam: 0 to 4 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

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

#### **Management**

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

### **354D—Farside loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,900 to 6,150 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

##### **Major Components**

Farside and similar soils: 90 percent

##### **Minor Components**

Sawicki cobbly loam: 0 to 4 percent  
 Bowery loam: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

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

#### **Management**

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

#### **Glendive Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid  
*Landform:* Alluvial fans and flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Elevation range:* 3,950 to 4,900 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

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

#### **Typical Pedon**

Glendive sandy loam, 0 to 2 percent slopes, in an area of cropland, 1,400 feet north and 2,500 feet west of the southeast corner of sec. 21, T. 1 S., R. 2 E.

A—0 to 6 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

C1—6 to 36 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2 moist); weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—36 to 46 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3 moist); massive; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C3—46 to 60 inches; white (10YR 7/2) fine sandy loam, brown (10YR 5/3 moist); massive; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2 or 3

Clay content: 5 to 18 percent

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

Reaction: pH 7.4 to 8.4

#### C1 horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2, 3, or 4

Texture: Sandy loam or silt loam

Clay content: 5 to 18 percent

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

Reaction: pH 7.4 to 8.4

#### C2 horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2, 3, or 4

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

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

Reaction: pH 7.4 to 8.4

#### C3 horizon

Hue: 10YR, 2.5Y, or 5Y

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

Chroma: 2, 3, or 4

Texture: Stratified fine sandy loam or silt loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.9 to 8.4

### 3A—Glendive sandy loam, 0 to 2 percent slopes

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 2 percent

*Elevation:* 3,950 to 4,750 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Glendive and similar soils: 85 percent

##### Minor Components

Fairway loam, slightly saline: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Soils with dark surfaces: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 9.2 inches

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

#### Management

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

### 3C—Glendive sandy loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans

*Slope:* 2 to 8 percent

*Elevation:* 4,000 to 4,900 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Glendive and similar soils: 85 percent

### Minor Components

Glendive coarse sandy loam: 0 to 5 percent

Glendive rarely flooded: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Sandy loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

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

## Management

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

## GP—Gravel pit

### Composition

#### Major Components

Gravel pit: 100 percent

#### Major Component Description

*Definition:* Areas mined for sand and gravel.

### Greycliff Series

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

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landform:* Low stream terraces and protected flood plains

*Parent material:* Calcareous alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,950 to 4,300 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 120 days

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

## Typical Pedon

Greycliff silt loam, in an area of Greycliff-Toston-Threeriv complex, 0 to 2 percent slopes, in an area of rangeland, 500 feet north and 200 feet east of the southwest corner of sec. 21, T. 2 N., R. 2 E.

A—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; many very fine, common fine and few medium pores; strongly effervescent; slightly alkaline; clear smooth boundary.

Btn—5 to 11 inches; gray (10YR 5/1) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to strong medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; many very fine and common fine pores; common faint clay films on faces of peds and lining pores; strongly effervescent; strongly alkaline; gradual wavy boundary.

Btkn—11 to 15 inches; light brownish gray (10YR 6/2) clay loam; dark gray (10YR 4/1) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; many very fine and common fine pores; common faint clay films on faces of peds and lining pores; common fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bkn—15 to 31 inches; light brownish gray (10YR 6/2) clay loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common very fine and few fine and medium pores; common fine masses of lime; violently effervescent; very strongly alkaline; clear smooth boundary.

C—31 to 37 inches; light brownish gray (10YR 6/2) sandy loam, dark gray (10YR 4/1) moist; common fine distinct dark yellowish brown (7.5YR 5/3) moist redox concentrations; massive; hard, friable, slightly sticky, and slightly plastic; few very fine roots; common very fine and few fine and medium pores; slightly effervescent; slightly alkaline; clear smooth boundary.

2C—37 to 60 inches; variegated very cobbly loamy sand; single grain; loose, nonsticky, and

nonplastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to seasonal high water table:* 24 to 42 inches

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

#### A horizon

Chroma: 1 or 2

Texture: Silt loam or loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

#### Btn horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Sodium adsorption ratio: 13 to 30

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 8.5 to 9.6

#### Btkn horizon

Value: 4 or 5 moist

Chroma: 1, 2, or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 9.0 to 9.6

#### Bkn horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1, 2, or 3

Texture: Clay loam, sandy loam, or sandy clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 8.5 to 9.6

#### C horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 to 3

Texture: Clay loam, sandy clay loam, or sandy loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.4 to 8.4

#### 2C horizon

Value: 6 or 7 or variegated dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loamy sand, sand, coarse sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 50 percent—0 to 25 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 7.4 to 8.4

### 519A—Greycliff loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,000 to 4,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Greycliff and similar soils: 90 percent

##### Minor Components

Rivra gravelly sandy loam: 0 to 5 percent

Threeriv loam: 0 to 3 percent

Slickspots: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

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

### Management

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

### 528A—Greycliff-Lamoose silt loams, 0 to 2 percent slopes

#### Setting

##### *Landform:*

- Greycliff—Stream terraces
- Lamoose—Stream terraces

##### *Slope:*

- Greycliff—0 to 2 percent
- Lamoose—0 to 2 percent

*Elevation:* 4,150 to 4,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Greycliff and similar soils: 60 percent

Lamoose and similar soils: 30 percent

##### Minor Components

Reycreek loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

#### Major Component Description

##### Greycliff

*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:* None

*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

##### Lamoose

*Surface layer texture:* Silt loam

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

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.5 inches

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

### Management

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

### 526A—Greycliff-Rivra-Threeriv complex, 0 to 2 percent slopes

#### Setting

##### *Landform:*

- Greycliff—Stream terraces
- Rivra—Stream terraces
- Threeriv—Stream terraces

##### *Slope:*

- Greycliff—0 to 2 percent
- Rivra—0 to 2 percent
- Threeriv—0 to 2 percent

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

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Greycliff and similar soils: 40 percent

Rivra and similar soils: 25 percent

Threeriv and similar soils: 20 percent

##### Minor Components

Emyd loam: 0 to 8 percent

Toston loam: 0 to 5 percent

Slickspots: 0 to 2 percent

#### Major Component Description

##### Greycliff

*Surface layer texture:* Loam

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

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

##### Rivra

*Surface layer texture:* Cobbly 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

*Water table:* Apparent

*Available water capacity:* Mainly 2.0 inches

**Threeriv**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.4 inches

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

**Management**

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

**525A—Greycliff-Toston-Threeriv complex, 0 to 2 percent slopes****Setting***Landform:*

- Greycliff—Stream terraces
- Toston—Stream terraces
- Threeriv—Stream terraces

*Slope:*

- Greycliff—0 to 2 percent
- Toston—0 to 2 percent
- Threeriv—0 to 2 percent

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

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Greycliff and similar soils: 60 percent

Toston and similar soils: 20 percent

Threeriv and similar soils: 10 percent

**Minor Components**

Reycreek loam: 0 to 5 percent

Rivra gravelly sandy loam: 0 to 3 percent

Slickspots: 0 to 2 percent

**Major Component Description****Greycliff**

*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:* None  
*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.7 inches

**Toston**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.5 inches

**Threeriv**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.4 inches

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

**Management**

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

**Hanson Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains, hills, alluvial fans, and stream terraces  
*Parent material:* Limestone colluvium or limestone alluvium  
*Slope range:* 8 to 45 percent  
*Elevation range:* 4,400 to 7,650 feet  
*Annual precipitation:* 17 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, carbonatic Calcic Haplocryolls

**Typical Pedon**

Hanson loam, 8 to 25 percent slopes, in an area of forest land, 1,800 feet south and 100 feet east of the northwest corner of sec. 33, T. 5 N., R. 6 E.

Oa—0 to 1 inch; decomposed forest litter.

A1—1 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

A2—7 to 15 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles; neutral; clear smooth boundary.

Bk1—15 to 22 inches; light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 10 percent cobbles and 30 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—22 to 60 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 10 percent cobbles and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 15 inches

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

#### A1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 15 to 27 percent

Content of rock fragments: 5 to 50 percent—0 to 10 percent boulders or stones; 0 to 20 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 8.4

#### A2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 55 percent—0 to 10 percent stones; 5 to 25 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 30 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 30 to 40 percent in the less than 2 mm fraction and more than 40 percent in the less than 20 mm fraction

Reaction: pH 7.4 to 8.4

#### Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 25 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.4 to 8.4

## 81E—Hanson cobbly loam, 15 to 45 percent slopes, stony

### Setting

*Landform:* Hills

*Slope:* 15 to 45 percent

*Elevation:* 5,600 to 6,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Hanson and similar soils: 90 percent

#### Minor Components

Soils less than 20 inches deep to bedrock: 0 to 5 percent

Adel loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

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

### Management

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

## 481E—Hanson loam, 8 to 25 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 8 to 25 percent

*Elevation:* 5,350 to 7,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Hanson and similar soils: 85 percent

#### Minor Components

Hanson very stony loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 25 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:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

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

### Management

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

## 381E—Hanson, bouldery-Bridger complex, 8 to 25 percent slopes

### Setting

*Landform:*

- Hanson—Alluvial fans and stream terraces
- Bridger—Drainageways

*Slope:*

- Hanson—8 to 25 percent
- Bridger—8 to 25 percent

*Elevation:* 5,250 to 6,000 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Hanson and similar soils: 75 percent

Bridger and similar soils: 15 percent

#### Minor Components

Adel loam: 0 to 5 percent

Philipsburg stony loam: 0 to 5 percent

### Major Component Description

#### Hanson

*Surface layer texture:* Cobbly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.9 inches

#### Bridger

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

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

### Management

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

## 491E—Hanson-Whitore, stony complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Hanson—Mountains
- Whitore—Mountains

*Slope:*

- Hanson—15 to 45 percent
- Whitore—15 to 45 percent

*Elevation:* 4,400 to 7,450 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Hanson and similar soils: 55 percent

Whitore and similar soils: 30 percent

#### Minor Components

Soils less than 40 inches deep to bedrock: 0 to 8 percent

Accola loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Hanson

*Surface layer texture:* Loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.8 inches

#### Whitore

*Surface layer texture:* Gravelly loam

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

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

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

### Management

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

#### Havre Series

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

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,150 to 4,900 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

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

### Typical Pedon

Havre loam, in an area of Havre loam, calcareous surface, 0 to 2 percent slopes, in an area of hayland, 900 feet north and 1,800 feet west of the southeast corner of sec. 6, T. 1 S., R. 1 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine and very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1—8 to 29 inches; pale brown (10YR 6/3) loam consisting of thin strata of silt loam and fine sandy loam, dark brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—29 to 60 inches; light brownish gray (2.5Y 6/2) silt loam consisting of thin strata of loam and fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 10 to 27 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 6.1 to 8.4

#### C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, or clay loam consisting of thin strata of fine sandy loam, silt loam, or loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

### 102A—Havre loam, 0 to 2 percent slopes, rare flooding

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 2 percent

*Elevation:* 4,150 to 4,800 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Havre and similar soils: 90 percent

#### Minor Components

Glendive sandy loam: 0 to 5 percent  
 Straw loam: 0 to 3 percent  
 Fairway loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Available water capacity:* Mainly 9.8 inches

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

### Management

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

## 2A—Havre loam, calcareous surface, 0 to 2 percent slopes

### Setting

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Elevation:* 4,150 to 4,900 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Havre and similar soils: 85 percent

#### Minor Components

Fairway loam: 0 to 5 percent  
 Havre clay loam: 0 to 5 percent  
 Ryell fine sandy 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:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* Rare  
*Available water capacity:* Mainly 9.8 inches

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

### Management

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

### Headwaters Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Hills or sedimentary plains  
*Parent material:* Semiconsolidated, loamy sedimentary beds  
*Slope range:* 2 to 15 percent  
*Elevation range:* 4,150 to 5,300 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

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

### Typical Pedon

Headwaters cobbly loam, 2 to 8 percent slopes, in an area of cropland, 2,800 feet south and 1,000 feet west of the northeast corner of sec. 25 T. 1 N., R. 1 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent cobbles and 10 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

A2—5 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and moderately plastic; common very fine and fine and few medium roots; slightly effervescent; neutral; clear wavy boundary.

Bk—7 to 29 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—29 to 60 inches; pale yellow (2.5Y 7/4) weakly consolidated sedimentary beds that crush to a silty clay loam, (interbedded with semiconsolidated, sandy materials) light yellowish brown (2.5Y 6/4) moist; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 13 inches

*Depth to the Bk horizon:* 5 to 13 inches

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

#### Ap horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

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

Reaction: pH 7.4 to 8.4

#### A2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

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

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 9.0

*Note:* In some pedons this horizon consists of stratified silty clay loam and sandy clay loam.

## 220C—Headwaters cobbly loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Elevation:* 4,150 to 4,600 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Headwaters and similar soils: 85 percent

#### Minor Components

Cabbart loam: 0 to 5 percent

Headwaters very cobbly loam: 0 to 5 percent

Trimad very cobbly loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

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

### Management

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

## 20C—Headwaters loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Elevation:* 4,200 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Headwaters and similar soils: 85 percent

#### Minor Components

Amesha loam: 0 to 5 percent

Cabbart loam: 0 to 5 percent

Tanna clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

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

### Management

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

## 20D—Headwaters loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Elevation:* 4,200 to 5,300 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Headwaters and similar soils: 85 percent

#### Minor Components

Amesha loam: 0 to 5 percent  
 Cabbart loam: 0 to 5 percent  
 Tanna clay loam: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

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

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Hoppers Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained

*Permeability:* Moderately slow  
*Landform:* Hills  
*Parent material:* Interbedded sandstone and shale residuum  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,900 to 7,100 feet  
*Annual precipitation:* 15 to 22 inches  
*Annual air temperature:* 37 to 43 degrees F  
*Frost-free period:* 80 to 100 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Hoppers sandy clay loam, in an area of Hoppers, stony-Tolbert, very stony-Timberlin complex, 35 to 60 percent slopes, in an area of forest land, 900 feet north and 1,320 feet east of the southwest corner of sec. 9, T. 2 S., R. 7 E.

- A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium and few coarse roots; 2 percent cobbles and 10 percent pebbles, neutral; clear smooth boundary.
- Bt1—8 to 15 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky, and slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; 5 percent pebbles; neutral; clear smooth boundary.
- Bt2—15 to 26 inches; brown (10YR 5/3) sandy clay loam; dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; 10 percent pebbles; neutral; clear smooth boundary.
- Cr—26 to 33 inches; olive (5Y 5/3) semiconsolidated and weathered sandstone.
- R—33 inches; hard sandstone.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 15 inches  
*Depth to the R horizon:* 20 to 40 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 2 or 3

Texture: Sandy clay loam or loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 0 to 15 percent—0 to 3 percent stones; 0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.3

**Bt1 horizon**

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Texture: Sandy clay loam or clay loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.3

**Bt2 horizon**

Value: 4 or 5 dry  
 Chroma: 3 or 4  
 Texture: Sandy clay loam or clay loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.3

**847F—Hoppers, stony-Tolbert,  
 very stony-Rock outcrop complex,  
 35 to 60 percent slopes**

**Setting***Landform:*

- Hoppers—Hills
- Tolbert—Hills
- Rock outcrop—Hills

*Slope:*

- Hoppers—35 to 60 percent
- Tolbert—35 to 60 percent

*Elevation:* 4,900 to 6,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Hoppers and similar soils: 45 percent  
 Tolbert and similar soils: 25 percent  
 Rock outcrop: 20 percent

**Minor Components**

Farnuf loam: 0 to 5 percent  
 Soils with slopes more than 60 percent: 0 to 5 percent

**Major Component Description****Hoppers**

*Surface layer texture:* Sandy clay loam  
*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

**Tolbert**

*Surface layer texture:* Cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**647E—Hoppers, stony-Tolbert,  
 very stony-Timberlin complex,  
 15 to 35 percent slopes**

**Setting***Landform:*

- Hoppers—Hills, south aspects
- Tolbert—Hills, south aspects
- Timberlin—Hills, north aspects

*Slope:*

- Hoppers—15 to 35 percent
- Tolbert—15 to 35 percent
- Timberlin—15 to 35 percent

*Elevation:* 4,900 to 7,100 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

**Composition****Major Components**

Hoppers and similar soils: 50 percent  
 Tolbert and similar soils: 20 percent  
 Timberlin and similar soils: 20 percent

**Minor Components**

Adel loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

## Major Component Description

### Hoppers

*Surface layer texture:* Sandy clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

### Tolbert

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.8 inches

### Timberlin

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 647F—Hoppers, stony-Tolbert, very stony-Timberlin complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Hoppers—Hills, south aspects
- Tolbert—Hills, south aspects
- Timberlin—Hills, north aspects

##### *Slope:*

- Hoppers—35 to 60 percent
- Tolbert—35 to 60 percent
- Timberlin—35 to 60 percent

*Elevation:* 5,200 to 7,000 feet  
*Mean annual precipitation:* 17 to 22 inches  
*Frost-free period:* 65 to 100 days

## Composition

### Major Components

Hoppers and similar soils: 40 percent  
 Tolbert and similar soils: 25 percent  
 Timberlin and similar soils: 25 percent

### Minor Components

Blaincreek stony loam: 0 to 5 percent  
 Rock outcrop: 0 to 5 percent

## Major Component Description

### Hoppers

*Surface layer texture:* Sandy clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.0 inches

### Tolbert

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.8 inches

### Timberlin

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 547E—Hoppers-Adel-Tolbert, very stony complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Hoppers—Hills
- Adel—Hills
- Tolbert—Hills

#### Slope:

- Hoppers—15 to 45 percent
- Adel—15 to 45 percent
- Tolbert—15 to 45 percent

*Elevation:* 4,950 to 6,000 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Hoppers and similar soils: 40 percent

Adel and similar soils: 25 percent

Tolbert and similar soils: 20 percent

#### Minor Components

Blaincreek loam: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Hoppers

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

#### Adel

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

#### Tolbert

*Surface layer texture:* Cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Hyalite Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow above the 3C horizon and rapid in the 3C horizon

*Landform:* Alluvial fans or stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,350 to 6,150 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Hyalite loam, in an area of Hyalite-Beaverton complex, 0 to 4 percent slopes, in an area of hayland, 100 feet south and 300 feet east of the northwest corner of sec. 13, T. 3 S., R. 4 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—5 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—8 to 17 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots;

common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; gradual wavy boundary.

**2Bt3**—17 to 26 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; loose, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; few faint clay films on faces of peds; 30 percent cobbles and 25 percent pebbles; neutral; clear wavy boundary.

**3C**—26 to 60 inches; variegated very cobbly loamy sand; massive; loose, nonsticky, and nonplastic; common very fine and few fine and medium roots; 30 percent cobbles and 30 percent pebbles; common distinct lime casts on undersides of coarse fragments; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the 2Bt3 horizon:* 11 to 22 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: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

*Note:* Some horizons may have a clay loam Ap horizon when cultivated.

#### *Bt1 horizon*

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam, loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bt2 horizon*

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Clay loam, silty clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 10 to 35 percent—5 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

#### *2Bt3 horizon*

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Sandy clay loam, sandy loam, or coarse sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 40 to 75 percent—20 to 35 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

#### *3C horizon*

Texture: Loamy sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 75 percent—20 to 35 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

## 748A—Hyalite-Beaverton complex, 0 to 4 percent slopes

### Setting

#### *Landform:*

- Hyalite—Alluvial fans and stream terraces
- Beaverton—Alluvial fans and stream terraces

#### *Slope:*

- Hyalite—0 to 4 percent
- Beaverton—0 to 4 percent

*Elevation:* 4,350 to 6,150 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Hyalite and similar soils: 70 percent

Beaverton and similar soils: 20 percent

#### Minor Components

Soils with slopes more than 4 percent: 0 to 5 percent

Turner loam: 0 to 5 percent

### Major Component Description

#### Hyalite

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

#### Beaverton

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 448A—Hyalite-Beaverton complex, moderately wet, 0 to 2 percent slopes

### Setting

#### Landform:

- Hyalite—Alluvial fans and stream terraces
- Beaverton—Alluvial fans and stream terraces

#### Slope:

- Hyalite—0 to 2 percent
- Beaverton—0 to 2 percent

*Elevation:* 4,450 to 5,300 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Hyalite and similar soils: 70 percent

Beaverton and similar soils: 20 percent

#### Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

### Major Component Description

#### Hyalite

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 4.3 inches

#### Beaverton

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 3.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Jaegje Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Gneiss or schist colluvium or igneous colluvium

*Slope range:* 8 to 60 percent

*Elevation range:* 5,200 to 7,100 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive  
Eutric Haplocryalfs

### Typical Pedon

Jaegje gravelly coarse sandy loam, in an area of Jaegje-Shadow, stony complex, 15 to 45 percent slopes, in an area of forest land, 2,300 feet south and 2,000 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

Oi—0 to 2 inches; slightly decomposed forest debris.

A—2 to 4 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; many very fine and common fine pores; 5 percent cobbles and 20 percent pebbles; slightly acid; clear smooth boundary.

E—4 to 15 inches; yellowish brown (10YR 5/4) gravelly coarse sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine pores; 5 percent cobbles and 10 percent pebbles; moderately acid; clear smooth boundary.

E/Bt—15 to 25 inches; E part (60 percent) is yellowish brown (10YR 5/4) gravelly coarse sandy loam, brown (10YR 4/3) moist; Bt part (40 percent) is yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and nonplastic;

common very fine and fine and few medium roots; many very fine and common fine pores; few faint clay films on faces of peds and pebbles; 5 percent cobbles and 15 percent pebbles; moderately acid; clear wavy boundary.

**Bt**—25 to 43 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam; dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine pores; common distinct clay films on faces of peds and pebbles; 5 percent cobbles and 20 percent pebbles; moderately acid; clear wavy boundary.

**C**—43 to 60 inches; yellowish brown (10YR 5/4) gravelly coarse sandy loam; dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; many very fine and fine and common medium pores; 5 percent cobbles and 20 percent pebbles; moderately acid.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

#### *A horizon*

Value: 3 or 4 moist

Chroma: 3 or 4

Texture: Coarse sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### *E horizon*

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3, 4, or 6

Texture: Coarse sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### *E/Bt horizon*

Value: E part 5 or 6 dry; 3 or 4 moist; Bt part 4 or 5 dry; 3, 4, or 5 moist

Chroma: 3 to 6

Texture: Coarse sandy loam or sandy clay loam (mixed)

Clay content: 18 to 30 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

#### *Bt horizon*

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 4 or 6

Clay content: 22 to 35 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 5.6 to 6.5

#### *C horizon*

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 4 to 6

Texture: Sandy loam or coarse sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 5.6 to 6.5

## 190E—Jaegie gravelly coarse sandy loam, 8 to 35 percent slopes

### Setting

*Landform:* Mountains

*Slope:* 8 to 35 percent

*Elevation:* 5,200 to 6,850 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Jaegie and similar soils: 90 percent

#### Minor Components

Shadow stony coarse sandy loam: 0 to 5 percent

Bavdark loam, moist: 0 to 4 percent

Mooseflat loam: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Gravelly coarse sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 290E—Jaegie loam, 15 to 35 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 5,800 to 6,550 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Jaegie and similar soils: 90 percent

#### Minor Components

Cowood very stony loam: 0 to 3 percent  
Timberlin stony loam: 0 to 3 percent  
Rock outcrop: 0 to 2 percent  
Soils with slopes more than 35 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:* Igneous colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 90F—Jaegie loam, 35 to 60 percent slopes

### Setting

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,800 to 7,100 feet  
*Mean annual precipitation:* 25 to 30 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Jaegie and similar soils: 85 percent

#### Minor Components

Cowood very stony loam: 0 to 5 percent  
Rubble land: 0 to 5 percent  
Shadow stony coarse sandy 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:* Gneiss or schist colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 590E—Jaegie-Shadow, stony complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Jaegie—Mountains
- Shadow—Mountains

*Slope:*

- Jaegie—15 to 25 percent
- Shadow—15 to 45 percent

*Elevation:* 5,300 to 6,500 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Jaegie and similar soils: 70 percent  
Shadow and similar soils: 20 percent

#### Minor Components

Bavdark loam, moist: 0 to 5 percent  
Cowood channery sandy loam: 0 to 3 percent  
Rock outcrop: 0 to 2 percent

### Major Component Description

#### Jaegie

*Surface layer texture:* Gravelly coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

#### Shadow

*Surface layer texture:* Very cobbly coarse 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:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 890E—Jaegie-Shadow, stony complex, cool, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Jaegie—Mountains
- Shadow—Mountains

#### *Slope:*

- Jaegie—15 to 45 percent
- Shadow—15 to 45 percent

*Elevation:* 5,900 to 6,950 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Jaegie and similar soils: 60 percent

Shadow and similar soils: 25 percent

#### Minor Components

Soils with slopes more than 45 percent: 0 to 8 percent

Cowood channery sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Jaegie

*Surface layer texture:* Gravelly coarse sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

#### Shadow

*Surface layer texture:* Very cobbly coarse 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:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Kalsted Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Landform:* Alluvial fans, relict stream terraces, stream terraces, or escarpments

*Parent material:* Colluvium or alluvium

*Slope range:* 0 to 45 percent

*Elevation range:* 3,950 to 5,400 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Aridic Calcustepts

### Typical Pedon

Kalsted sandy loam, 0 to 4 percent slopes, in an area of cropland, 1,000 feet north and 800 feet east of the southwest corner of sec. 1, T. 1 N., R. 2 E.

Ap—0 to 6 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very fine pores; 5 percent pebbles; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—6 to 15 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very fine pores; 5 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—15 to 26 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine roots; common very fine pores; 10 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

**Bk3**—26 to 42 inches; very pale brown (10YR 7/4) sandy loam, brown (10YR 5/3) moist; single grain; loose, very friable, nonsticky, and nonplastic; few very fine roots; common very fine and fine pores; 10 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; diffuse smooth boundary.

**BC**—42 to 60 inches; very pale brown (10YR 7/3) sandy loam, light brownish gray (10YR 6/3) moist; massive; loose, nonsticky, and nonplastic; common very fine and fine pores; 10 percent pebbles; 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:* 6 to 12 inches

#### *Ap horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

#### *Bk1 horizon*

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

#### *Bk2 and Bk3 horizons*

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Sandy loam with lenses of loamy sand

Clay content: 5 to 18 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

#### *BC horizon*

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Sandy loam with lenses of loamy sand

Clay content: 5 to 15 percent

Content of rock fragments: 10 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

## **135E—Kalsted gravelly sandy loam, 15 to 35 percent slopes**

### Setting

*Landform:* Escarpments

*Slope:* 15 to 35 percent

*Elevation:* 3,950 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Kalsted and similar soils: 85 percent

#### Minor Components

Blacksheep sandy loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## **35B—Kalsted sandy loam, 0 to 4 percent slopes**

### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 0 to 4 percent

*Elevation:* 3,950 to 4,850 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Kalsted and similar soils: 85 percent

**Minor Components**

Kalsted cobbly sandy loam: 0 to 5 percent  
 Soils with slopes more than 4 percent: 0 to 5 percent  
 Trimad cobbly sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Sandy 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 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**35C—Kalsted sandy loam,  
4 to 8 percent slopes****Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 4,000 to 5,050 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Kalsted and similar soils: 85 percent

**Minor Components**

Chinook sandy loam: 0 to 5 percent  
 Kalsted cobbly sandy loam: 0 to 5 percent  
 Trimad cobbly sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Sandy 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 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**35D—Kalsted sandy loam,  
8 to 15 percent slopes****Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,000 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Kalsted and similar soils: 85 percent

**Minor Components**

Musselshell loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent  
 Trimad cobbly sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Sandy 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 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Kelstrup Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Relict stream terraces  
*Parent material:* Loess  
*Slope range:* 0 to 15 percent  
*Elevation range:* 4,150 to 5,550 feet  
*Annual precipitation:* 12 to 16 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Aridic Haplustolls

### Typical Pedon

Kelstrup silt loam, 4 to 8 percent slopes, in an area of cropland, 1,300 feet south and 1,100 feet west of the northeast corner of sec. 6, T. 2 N., R. 3 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bw1—5 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; few very fine tubular and interstitial pores; slightly alkaline; gradual wavy boundary.

Bw2—8 to 14 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, and nonplastic; common very fine roots; few very fine tubular pores; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—14 to 28 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; few very fine tubular and interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—28 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; few very fine tubular and interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to the Bk horizon:* 11 to 20 inches

#### Ap horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 5 percent pebbles  
Reaction: pH 6.6 to 7.8

#### Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 12 to 20 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

#### Bk horizons

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

## 31C—Kelstrup silt loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,200 to 5,400 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Kelstrup and similar soils: 85 percent

#### Minor Components

Amsterdam silt loam: 0 to 5 percent

Brocko silt loam: 0 to 5 percent

Kalsted 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:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 31D—Kelstrup silt loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,150 to 5,550 feet  
*Mean annual precipitation:* 12 to 16 inches  
*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Kelstrup and similar soils: 85 percent

##### Minor Components

Amsterdam silt loam: 0 to 5 percent  
 Brocko silt loam: 0 to 5 percent  
 Kalsted sandy loam: 0 to 3 percent  
 Soils with slopes more 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 431B—Kelstrup-Brocko silt loams, 0 to 4 percent slopes

#### Setting

*Landform:*

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

*Slope:*

- Kelstrup—0 to 4 percent
- Brocko—0 to 4 percent

*Elevation:* 4,200 to 5,050 feet  
*Mean annual precipitation:* 12 to 16 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Kelstrup and similar soils: 65 percent  
 Brocko and similar soils: 20 percent

#### Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent  
 Soils with slopes more than 4 percent: 0 to 5 percent  
 Trimad cobbly sandy loam: 0 to 5 percent

#### Major Component Description

##### Kelstrup

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

##### Brocko

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 431C—Kelstrup-Brocko silt loams, 4 to 8 percent slopes

#### Setting

*Landform:*

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

*Slope:*

- Kelstrup—4 to 8 percent
- Brocko—4 to 8 percent

*Elevation:* 4,200 to 5,250 feet  
*Mean annual precipitation:* 12 to 16 inches  
*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Kelstrup and similar soils: 65 percent  
Brocko and similar soils: 20 percent

### Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent  
Soils with slopes more than 8 percent: 0 to 5 percent  
Trimad cobbly sandy loam: 0 to 5 percent

### Major Component Description

#### Kelstrup

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

#### Brocko

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 431D—Kelstrup-Brocko silt loams, 8 to 15 percent slopes

### Setting

#### Landform:

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

#### Slope:

- Kelstrup—8 to 15 percent
- Brocko—8 to 15 percent

*Elevation:* 4,350 to 5,050 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Kelstrup and similar soils: 55 percent  
Brocko and similar soils: 35 percent

### Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent  
Trimad cobbly sandy loam: 0 to 3 percent  
Soils with slopes more than 15 percent: 0 to 2 percent

### Major Component Description

#### Kelstrup

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.0 inches

#### Brocko

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.0 inches

A typical description with range in characteristics is 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 (more than 60 inches)

*Drainage class:* Poorly drained

*Permeability:* Moderate in the A and B horizons and rapid below

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,000 to 5,000 feet

*Annual precipitation:* 10 to 18 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 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, 300 feet south and 2,300 feet west of the northeast corner of sec. 34, T. 2 N., R. 3 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bg1—9 to 22 inches; dark gray (5Y 4/1) silt loam, grayish brown (2.5Y 5/2) dry; strong fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.

Bg2—22 to 27 inches; dark gray (5Y 4/1) silt loam, grayish brown (2.5Y 5/2) dry with stratified lenses of strong brown (7.5YR 4/6) loamy sand; strong fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly effervescent; neutral; abrupt irregular boundary.

2C—27 to 60 inches; variegated extremely gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 50 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to seasonal high water table:* 12 to 24 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

#### Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 1 or 2

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent pebbles

Reaction: pH 6.6 to 7.8

#### 2C horizon

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

### 537A—Lamoose silt loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Lamoose and similar soils: 85 percent

##### Minor Components

Bonebasin loam: 0 to 10 percent

Meadowcreek loam: 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:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 541A—Lamoose-Rivra-Bonebasin complex, 0 to 2 percent slopes

### Setting

#### Landform:

- Lamoose—Flood plains
- Rivra—Flood plains
- Bonebasin—Flood plains

#### Slope:

- Lamoose—0 to 2 percent
- Rivra—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 4,000 to 4,700 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Lamoose and similar soils: 50 percent

Rivra and similar soils: 25 percent

Bonebasin and similar soils: 15 percent

#### Minor Components

Ryell sandy loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

### Major Component Description

#### Lamoose

*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:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.5 inches

#### Rivra

*Surface layer texture:* Cobbly sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 2.0 inches

#### Bonebasin

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Lap Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains and hills

*Parent material:* Limestone residuum

*Slope range:* 8 to 60 percent

*Elevation range:* 4,150 to 7,300 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-skeletal, carbonatic, frigid  
Lithic Calciustolls

### Typical Pedon

Lap very cobbly loam, in an area of Windham, stony, moist-Lap, very stony-Hanson complex, 15 to 45 percent slopes, in an area of rangeland, 500 feet north and 2,000 feet east of the southwest corner of sec. 4, T. 3 N., R. 4 E.

A—0 to 5 inches; very dark gray (10YR 3/1) very cobbly loam, black (10YR 2/1) moist; moderate fine subangular blocky parting to moderate fine granular structure; soft, friable, slightly sticky, and nonplastic; many very fine and fine and few medium roots; 5 percent stones, 25 percent cobbles, and 15 percent pebbles; slightly alkaline; clear wavy boundary.

Bw—5 to 11 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, friable, slightly sticky, and nonplastic; many very fine and common fine and medium roots; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk—11 to 16 inches; grayish brown (10YR 5/2) extremely gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and nonplastic; common

very fine and few fine and medium roots; 5 percent stones, 25 percent cobbles, and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

R—16 inches; hard limestone bedrock.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to bedrock:* 10 to 20 inches

*Depth to the Bk horizon:* 4 to 12 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 30 to 55 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 10 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 7.8

#### Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 30 to 55 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 25 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 50 to 75 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 30 to 40 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.9 to 8.4

## 666F—Lap-Windham-Rock outcrop complex, 35 to 60 percent slopes

### Setting

#### Landform:

- Lap—Hills
- Windham—Hills

- Rock outcrop—Hills

#### Slope:

- Lap—35 to 60 percent
- Windham—35 to 60 percent

*Elevation:* 4,150 to 6,550 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Lap and similar soils: 50 percent

Windham and similar soils: 25 percent

Rock outcrop: 15 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

Windham stony loam, moist: 0 to 5 percent

### Major Component Description

#### Lap

*Surface layer texture:* Very cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

#### Windham

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

#### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Libeg Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills, escarpments, outwash plains, relict stream terraces, stream terraces, and alluvial fans

*Parent material:* Alluvium, sandstone colluvium, or alpine till

*Slope range:* 0 to 60 percent

*Elevation range:* 5,100 to 7,400 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Argicryolls

### Typical Pedon

Libeg cobbly loam, 0 to 4 percent slopes, in an area of rangeland, 1,200 feet south and 100 feet west of the northeast corner of sec. 2, T. 7 S., R. 3 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; 15 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

Bt1—7 to 22 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, and nonplastic; common distinct clay films on faces of ped; 15 percent cobbles and 45 percent pebbles; neutral; gradual wavy boundary.

Bt2—22 to 45 inches; brown (10YR 5/3) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common distinct clay films on faces of ped; 40 percent cobbles and 25 percent pebbles; slightly alkaline; clear wavy boundary.

BC—45 to 60 inches; grayish brown (10YR 5/2) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, and nonplastic; 35 percent cobbles and 30 percent pebbles; few faint lime coatings on coarse fragments; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 25 to 60 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 15 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, sandy clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent stones; 20 to 40 percent cobbles; 25 to 45 percent pebbles

Reaction: pH 6.1 to 7.8

#### BC horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, sandy loam, clay loam, or sandy clay loam

Clay content: 15 to 35 percent

Content of rock fragments: 40 to 70 percent—0 to 20 percent stones; 20 to 35 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 7.4 to 7.8

## 280B—Libeg cobbly loam, 0 to 4 percent slopes

### Setting

*Landform:* Outwash plains

*Slope:* 0 to 4 percent

*Elevation:* 5,600 to 6,550 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Adel loam: 0 to 5 percent

Libeg very cobbly loam: 0 to 5 percent

Philipsburg loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 380D—Libeg cobbly loam, 8 to 15 percent slopes, stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 5,350 to 7,350 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Libeg extremely stony loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 380E—Libeg cobbly loam, 15 to 35 percent slopes, stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 15 to 35 percent

*Elevation:* 5,200 to 7,300 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Adel loam: 0 to 5 percent

Libeg extremely stony loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 380F—Libeg very cobbly loam, 35 to 60 percent slopes, extremely stony

### Setting

*Landform:* Escarpments

*Slope:* 35 to 60 percent

*Elevation:* 5,850 to 6,700 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 85 percent

#### Minor Components

Adel stony loam: 0 to 10 percent

Copenhaver channery loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Very cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 480E—Libeg, stony-Copenhaver complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Libeg—Hills
- Copenhaver—Hills

*Slope:*

- Libeg—15 to 45 percent
- Copenhaver—15 to 45 percent

*Elevation:* 5,750 to 7,400 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 60 percent

Copenhaver and similar soils: 30 percent

#### Minor Components

Adel loam: 0 to 4 percent

Libeg extremely stony loam: 0 to 4 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Libeg

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

#### Copenhaver

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 580E—Libeg, very stony-Copenhaver, extremely stony-Adel complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Libeg—Hills
- Copenhaver—Hills
- Adel—Hills

*Slope:*

- Libeg—15 to 45 percent
- Copenhaver—15 to 45 percent
- Adel—15 to 45 percent

*Elevation:* 5,150 to 6,500 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Libeg and similar soils: 45 percent

Copenhaver and similar soils: 30 percent

Adel and similar soils: 15 percent

#### Minor Components

Soils with slopes more than 45 percent: 0 to 7 percent

Rock outcrop: 0 to 3 percent

### Major Component Description

#### Libeg

*Surface layer texture:* Very cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

#### Copenhaver

*Surface layer texture:* Extremely channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

**Adel***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Loberg Series***Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Mountains*Parent material:* Sandstone colluvium*Slope range:* 8 to 60 percent*Elevation range:* 5,300 to 8,800 feet*Annual precipitation:* 25 to 30 inches*Annual air temperature:* 34 to 38 degrees F*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive Ustic Glossocryalfs

**Typical Pedon**

Loberg very flaggy loam, in an area of Loberg, very stony-Yellowmule, stony-Redlodge complex, 4 to 35 percent slopes, in an area of forest land, 1,800 feet north and 900 feet east of the southwest corner of sec. 14, T. 7 S., R. 3 E.

Oi—0 to 2 inches; slightly decomposed needles and twigs.

E1—2 to 14 inches; pale brown (10YR 6/3) very flaggy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent stones, 30 percent flagstones, and 15 percent channers; moderately acid; gradual wavy boundary.

E2—14 to 22 inches; light gray (10YR 7/2) very flaggy loam, yellowish brown (10YR 5/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and nonplastic; common very fine and fine and few medium and coarse roots; 30

percent flagstones and 20 percent channers; slightly acid; gradual wavy boundary.

Bt/E—22 to 37 inches; Bt part (80 percent) pale brown (10YR 6/3) very channery clay loam, brown (10YR 5/3) moist; E part (20 percent) light gray (10YR 7/2) very channery clay loam, yellowish brown (10YR 5/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; 15 percent flagstones and 30 percent channers; neutral; gradual wavy boundary.

Bt—37 to 60 inches; pale brown (10YR 6/3) very channery clay loam, brown (10YR 5/3) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of peds; 10 percent flagstones and 35 percent channers; neutral.

**Range in Characteristics***Soil temperature:* 36 to 40 degrees F*Moisture control section:* Between 4 and 12 inches*E horizons*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 65 percent—1 to 5 percent stones; 15 to 30 percent cobbles or flagstones; 15 to 30 percent pebbles or channers

Reaction: pH 5.6 to 7.3

*Bt/E horizon*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: Bt part 3, 4, or 5 moist; 4, 5, or 6 dry; E part 3, 4, or 5 moist; 5, 6, or 7 dry

Chroma: 2, 3, or 4

Clay content: 27 to 40 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 5.6 to 7.3

*Bt horizon*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 60 percent—10 to 30 percent cobbles or flagstones; 20 to 35 percent pebbles or channers

Reaction: pH 5.6 to 7.3

**696E—Loberg very flaggy loam,  
15 to 35 percent slopes, very stony**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 7,800 to 8,800 feet  
*Mean annual precipitation:* 25 to 30 inches  
*Frost-free period:* 30 to 55 days

**Composition**

**Major Components**

Loberg and similar soils: 85 percent

**Minor Components**

Redchief stony loam: 0 to 10 percent  
Danaher stony loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Very flaggy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**396F—Loberg very flaggy loam,  
35 to 60 percent slopes, very stony**

**Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,350 to 7,000 feet  
*Mean annual precipitation:* 25 to 30 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 90 percent

**Minor Components**

Cowood very stony loam: 0 to 8 percent  
Rock outcrop: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Very flaggy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**96E—Loberg very flaggy loam, cool,  
15 to 35 percent slopes, very stony**

**Setting**

*Landform:* Mountains  
*Slope:* 15 to 35 percent  
*Elevation:* 6,650 to 7,000 feet  
*Mean annual precipitation:* 25 to 30 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 90 percent

**Minor Components**

Lonniebee stony loam: 0 to 5 percent  
Cowood very stony loam: 0 to 2 percent  
Danaher stony loam: 0 to 2 percent  
Rock outcrop: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Very flaggy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**396E—Loberg, very stony-Danaher, stony complex, 15 to 45 percent slopes****Setting***Landform:*

- Loberg—Mountains
- Danaher—Mountains

*Slope:*

- Loberg—15 to 45 percent
- Danaher—15 to 45 percent

*Elevation:* 5,500 to 7,000 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Loberg and similar soils: 70 percent

Danaher and similar soils: 20 percent

**Minor Components**

Cowood very stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches**Danaher***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 9.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**796E—Loberg, very stony-Yellowmule complex, 8 to 35 percent slopes****Setting***Landform:*

- Loberg—Mountains
- Yellowmule—Mountains

*Slope:*

- Loberg—8 to 35 percent
- Yellowmule—8 to 35 percent

*Elevation:* 6,600 to 7,700 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Loberg and similar soils: 60 percent

Yellowmule and similar soils: 30 percent

**Minor Components**

Ouselfal very channery sandy: 0 to 5 percent

Rubble land: 0 to 3 percent

Redlodge silty clay loam: 0 to 2 percent

**Major Component Description****Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches**Yellowmule***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**596E—Loberg, very stony-Yellowmule,  
stony-Redlodge complex,  
4 to 35 percent slopes**

**Setting**

*Landform:*

- Loberg—Mountains
- Yellowmule—Mountains
- Redlodge—Closed depressions

*Slope:*

- Loberg—8 to 35 percent
- Yellowmule—8 to 35 percent
- Redlodge—4 to 6 percent

*Elevation:* 6,500 to 7,950 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Loberg and similar soils: 50 percent

Yellowmule and similar soils: 30 percent

Redlodge and similar soils: 10 percent

**Minor Components**

Soils with slopes more than 35 percent: 0 to 5 percent

Soils with a water table at 1 to 3 feet: 0 to 5 percent

**Major Component Description**

**Loberg**

*Surface layer texture:* Very flaggy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.0 inches

**Yellowmule**

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

**Redlodge**

*Surface layer texture:* Silty clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Lonniebee Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains and hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 4 to 70 percent

*Elevation range:* 5,200 to 8,400 feet

*Annual precipitation:* 25 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

**Typical Pedon**

Lonniebee flaggy loam, in an area of Yellowmule-Lonniebee, stony complex, 15 to 45 percent slopes, in an area of forest land, 1,320 feet south and 1,200 feet east of the northwest corner of sec. 26, T. 2 S., R. 7 E.

Oi—0 inch to 1; slightly decomposed leaves, needles, and twigs.

E—1 to 11 inches; light brownish gray (10YR 6/2) flaggy loam, dark grayish brown (10YR 4/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; common fine and few medium pores; 5 percent angular stones, 5 percent flagstones, and 20 percent channers; slightly acid; gradual smooth boundary.

Bt1—11 to 19 inches; brown (10YR 5/3) very flaggy clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots;

common very fine and few fine and medium pores; common faint clay films on faces of pedes and channer surfaces; 25 percent flagstones and 25 percent channers; moderately acid; clear smooth boundary.

**Bt2**—19 to 33 inches; light yellowish brown (10YR 6/4) very flaggy clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common very fine and fine and medium pores; common distinct clay films on faces of pedes and channer surfaces; 30 percent flagstones and 25 percent channers; moderately acid; gradual wavy boundary.

**Cr**—33 to 38 inches; weathered and fractured sandstone bedrock.

**R**—38 inches; hard sandstone bedrock.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the R horizon:* 20 to 40 inches

#### *E horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam or sandy loam

Clay content: 12 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 5 percent flagstones; 15 to 25 percent channers

Reaction: pH 5.6 to 6.5

#### *Bt1 horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 6

Texture: Loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent flagstones; 20 to 30 percent channers

Reaction: pH 5.6 to 7.3

#### *Bt2 horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 to 6

Texture: Loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 40 to 70 percent—20 to 35 percent flagstones; 20 to 35 percent channers

Reaction: pH 5.6 to 7.3

## 593E—Lonniebee-Cowood complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Lonniebee—Mountains
- Cowood—Mountains

#### *Slope:*

- Lonniebee—15 to 35 percent
- Cowood—15 to 35 percent

*Elevation:* 6,400 to 8,100 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Lonniebee and similar soils: 50 percent

Cowood and similar soils: 35 percent

#### Minor Components

Yellowmule loam: 0 to 8 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Lonniebee

*Surface layer texture:* Flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.0 inches

#### Cowood

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 593F—Lonniebee-Cowood complex, 35 to 60 percent slopes

#### Setting

*Landform:*

- Lonniebee—Mountains
- Cowood—Mountains

*Slope:*

- Lonniebee—35 to 60 percent
- Cowood—35 to 60 percent

*Elevation:* 6,050 to 8,100 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Lonniebee and similar soils: 60 percent

Cowood and similar soils: 25 percent

##### Minor Components

Yellowmule loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Lonniebee

*Surface layer texture:* Flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.0 inches

##### Cowood

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 794G—Lonniebee-Cowood complex, warm, 40 to 70 percent slopes

#### Setting

*Landform:*

- Lonniebee—Mountains
- Cowood—Mountains

*Slope:*

- Lonniebee—40 to 70 percent
- Cowood—40 to 70 percent

*Elevation:* 5,700 to 8,400 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Lonniebee and similar soils: 50 percent

Cowood and similar soils: 35 percent

##### Minor Components

Shadow stony sandy loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Lonniebee

*Surface layer texture:* Flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.0 inches

##### Cowood

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**M-W—Miscellaneous water****Composition****Major Components**

Water, miscellaneous: 100 percent

**Major Component Description**

*Definition:* Areas of sewage lagoons, industrial waste pits, fish hatcheries, etc.

**Marias Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Very slow

*Landform:* Relict stream terraces

*Parent material:* Alluvium

*Slope range:* 4 to 8 percent

*Elevation range:* 4,650 to 4,800 feet

*Annual precipitation:* 12 to 16 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine, smectitic, frigid Chromic Haplusterts

**Typical Pedon**

Marias silty clay, 4 to 8 percent slopes, in an area of hayland, 1,900 feet north and 850 feet west of the southeast corner of sec. 24, T. 2 S., R. 2 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; strong fine granular structure; very hard, very firm, moderately sticky, and very plastic; common very fine and fine roots; 1- to 2-inch wide cracks when dry; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bw—7 to 12 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure parting to moderate fine angular blocky; very hard, very firm, moderately sticky, and very plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bss—12 to 30 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; strong

medium angular blocky structure; very hard, very firm, moderately sticky, and very plastic; few fine roots; few distinct slickensides; few fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bssy—30 to 60 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; strong medium angular blocky structure; very hard, very firm, moderately sticky, and very plastic; few distinct slickensides; few fine masses and threads of gypsum; 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 Bssy horizon:* 20 to 45 inches

**Ap horizon**

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 4

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 1 to 10 percent

Reaction: pH 7.4 to 8.4

**Bw and Bss horizons**

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay or clay

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 4

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

**Bssy horizon**

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay or clay

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 4 to 13

Calcium carbonate equivalent: 5 to 10 percent

Gypsum content: 1 to 6 percent

Reaction: pH 7.9 to 8.4

## 19C—Marias silty clay, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,650 to 4,800 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Marias and similar soils: 90 percent

#### Minor Components

Danvers clay loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Silty clay

*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 7.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Martab Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains and escarpments

*Parent material:* Sandstone colluvium

*Slope range:* 15 to 60 percent

*Elevation range:* 5,000 to 7,100 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Ustollic  
Haplocryalfs

### Typical Pedon

Martab loam, 15 to 45 percent slopes, in an area of forest land, 2,600 feet south and 1,000 feet west of the northeast corner of sec. 27, T. 5 N., R. 4 E.

Oi—0 to 2 inches; moderately decomposed leaves, needles, and twigs.

A—2 to 6 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium and coarse roots; 5 percent pebbles; slightly acid; clear smooth boundary.

E—6 to 17 inches; reddish gray (5YR 5/2) clay loam, reddish brown (5YR 4/3) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—17 to 35 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt2—35 to 50 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of peds and lining pores; 15 percent soft siltstone chips; slightly effervescent; neutral; clear smooth boundary.

Bk—50 to 60 inches; reddish gray (5YR 5/2) clay loam, brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; 15 percent soft siltstone chips; common fine masses and seams of lime; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 35 to 60 inches

#### A horizon

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 3 percent stones; 0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.8

#### E horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Bt1 horizon**

Hue: 2.5YR, 5YR, or 7.5YR  
 Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 3 or 4  
 Texture: Clay or clay loam  
 Clay content: 35 to 45 percent  
 Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Bt2 horizon**

Hue: 2.5YR, 5YR, or 7.5YR  
 Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 3 or 4  
 Texture: Clay or clay loam  
 Clay content: 35 to 45 percent  
 Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Bk horizon**

Hue: 2.5YR, 5YR, or 7.5YR  
 Chroma: 2, 3, 4, or 6  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

### **92E—Martab loam, 15 to 45 percent slopes**

#### **Setting**

*Landform:* Mountains  
*Slope:* 15 to 45 percent  
*Elevation:* 5,000 to 7,100 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Martab and similar soils: 85 percent

##### **Minor Components**

Bangtail loam: 0 to 5 percent  
 Martab stony loam: 0 to 5 percent  
 Rocko 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:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **892F—Martab-Bangtail complex, 25 to 60 percent slopes, stony**

#### **Setting**

*Landform:*  
 • Martab—Escarpments  
 • Bangtail—Escarpments  
*Slope:*  
 • Martab—25 to 60 percent  
 • Bangtail—25 to 60 percent  
*Elevation:* 5,150 to 6,000 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Martab and similar soils: 65 percent  
 Bangtail and similar soils: 25 percent

##### **Minor Components**

Bridger loam, moist: 0 to 5 percent  
 Rocko stony loam: 0 to 5 percent

#### **Major Component Description**

##### **Martab**

*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:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 9.2 inches

##### **Bangtail**

*Surface layer texture:* Gravelly loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Martinsdale Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Alluvial fans, hills, relict stream terraces, and escarpments

*Parent material:* Alluvium or colluvium

*Slope range:* 0 to 35 percent

*Elevation range:* 4,350 to 6,500 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Martinsdale cobbly loam, 8 to 15 percent slopes, in an area of rangeland, 1,300 feet north and 2,000 feet east of the southwest corner of sec. 12, T. 2 S., R. 2 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; common fine tubular pores; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt—5 to 13 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine angular blocky; very hard, very firm, moderately sticky, and moderately plastic; many very fine and fine roots; 5 percent pebbles; common distinct clay films on faces of peds; neutral; gradual wavy boundary.

Bk1—13 to 26 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; few fine tubular pores; 5 percent cobbles and 10 percent pebbles;

common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—26 to 60 inches; light gray (10YR 7/2) gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 20 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 13 inches

*Depth to the Bk horizon:* 12 to 25 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 15 to 32 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2, 3, or 4

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

## 352C—Martinsdale clay loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 4 to 8 percent

*Elevation:* 4,650 to 5,450 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Meagher cobbly loam: 0 to 6 percent  
 Soils with slopes more than 8 percent: 0 to 6 percent  
 Beanlake loam: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 252D—Martinsdale cobbly loam, 8 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,550 to 5,850 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent  
 Meagher cobbly loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 52B—Martinsdale loam, 0 to 4 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 4,400 to 5,950 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Martinsdale cobbly loam: 0 to 5 percent  
 Meagher cobbly loam: 0 to 5 percent  
 Beanlake loam: 0 to 3 percent  
 Soils with slopes more 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.9 inches

A typical description with range in characteristics is 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—Martinsdale loam, 15 to 35 percent slopes

### Setting

*Landform:* Escarpments  
*Slope:* 15 to 35 percent

*Elevation:* 4,350 to 6,050 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Bowery loam: 0 to 5 percent  
 Meagher cobbly loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 3 percent  
 Beanlake gravelly loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 52C—Martinsdale loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 4,550 to 6,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Bowery loam: 0 to 5 percent  
 Meagher cobbly loam: 0 to 5 percent  
 Beanlake loam: 0 to 3 percent  
 Work clay loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 52D—Martinsdale loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 8 to 15 percent  
*Elevation:* 4,450 to 5,850 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 85 percent

#### Minor Components

Bowery loam: 0 to 5 percent  
 Meagher cobbly loam: 0 to 5 percent  
 Anceney cobbly loam: 0 to 3 percent  
 Beanlake loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 852D—Martinsdale-Cabba complex, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Martinsdale—Hills
- Cabba—Hills

##### *Slope:*

- Martinsdale—8 to 15 percent
- Cabba—8 to 15 percent

*Elevation:* 4,700 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Martinsdale and similar soils: 70 percent

Cabba and similar soils: 20 percent

##### Minor Components

Brodyk silt loam: 0 to 5 percent

Reedwest loam: 0 to 5 percent

#### Major Component Description

##### Martinsdale

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.9 inches

##### Cabba

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 652E—Martinsdale-Shawmut complex, 15 to 35 percent slopes, very stony

#### Setting

##### *Landform:*

- Martinsdale—Relict stream terraces and alluvial fans
- Shawmut—Relict stream terraces and alluvial fans

##### *Slope:*

- Martinsdale—15 to 35 percent
- Shawmut—15 to 35 percent

*Elevation:* 4,600 to 6,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Martinsdale and similar soils: 60 percent

Shawmut and similar soils: 25 percent

##### Minor Components

Martinsdale bouldery loam: 0 to 8 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Martinsdale

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

##### Shawmut

*Surface layer texture:* Very cobbly 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 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 652D—Martinsdale-Shawmut complex, 8 to 15 percent slopes, very stony

### Setting

*Landform:*

- Martinsdale—Relict stream terraces and alluvial fans
- Shawmut—Relict stream terraces and alluvial fans

*Slope:*

- Martinsdale—8 to 15 percent
- Shawmut—8 to 15 percent

*Elevation:* 4,500 to 6,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Martinsdale and similar soils: 60 percent

Shawmut and similar soils: 25 percent

#### Minor Components

Beanlake stony loam: 0 to 5 percent

Martinsdale bouldery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Martinsdale

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

#### Shawmut

*Surface layer texture:* Very cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Mccabe Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Permeability:* Moderately rapid

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,950 to 4,400 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Aeric Fluvaquents

### Typical Pedon

Mccabe loam, in an area of Rivra-Mccabe-Bonebasin complex, 0 to 2 percent slopes, moist, occasional flooding, in an area of pasture, 1,800 feet north and 1,900 feet west of the southeast corner of sec. 22, T. 2 N., R. 2 E.

A—0 to 7 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and few medium and coarse; strongly effervescent; slightly alkaline; clear smooth boundary.

C—7 to 21 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

2C—21 to 60 inches; variegated very cobbly loamy coarse sand; massive; loose, nonsticky, and

nonplastic; few very fine and fine roots; 25 percent cobbles and 30 percent pebbles; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 46 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to seasonal high water table:* 12 to 24 inches

*Depth to the 2C horizon:* 20 to 40 inches

#### A horizon

Value: 2, 3, 4, or 5 moist; 4, 5 or 6 dry

Chroma: 1 or 2

Clay content: 15 to 25 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 5.1 to 7.8

#### C horizon

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1, 2, or 3

Texture: Loam, sandy loam, fine sandy loam, or very fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

#### 2C horizon

Hue: 10YR or variegated

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1 or 2

Texture: Loamy sand, sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 70 percent—15 to 25 percent cobbles; 25 to 45 percent pebbles

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 7.8

### Meadowcreek Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate above the 2C horizon and very rapid in the 2C horizon

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,000 to 5,950 feet

*Annual precipitation:* 10 to 18 inches

*Annual air temperature:* 39 to 45 degrees F

*Frost-free period:* 90 to 115 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Fluvaquent Haplustolls

### Typical Pedon

Meadowcreek silty clay loam, in an area of Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes; 2,200 feet north and 3,200 feet west of the southeast corner of sec. 4, T. 1 N., R. 1 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

A—6 to 11 inches; dark gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bg1—11 to 19 inches; light brownish gray (10YR 6/2) silt loam with thin strata of sandy loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; few fine faint brown (7.5YR 5/4) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bg2—19 to 25 inches; light brownish gray (10YR 6/2) sandy clay loam with thin strata of sandy loam, and fine sandy loam, dark grayish brown (10YR 4/2) moist; many fine distinct brown (7.5YR 5/4) redox concentrations; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

2C1—25 to 29 inches; grayish brown (10YR 5/2) very gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 35 percent pebbles; slightly alkaline; clear wavy boundary.

2C2—29 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky, and

nonplastic; 10 percent cobbles and 40 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the 2C horizon:* 20 to 40 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 6.6 to 8.4

#### Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1, 2, or 3

Texture: Loam, silt loam, sandy clay loam, or sandy loam

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 6.6 to 8.4

#### 2C horizons

Texture: Sand or loamy sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 75 percent—0 to 10 percent cobbles; 35 to 65 percent pebbles

Reaction: pH 6.1 to 7.8

### 510B—Meadowcreek loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,200 to 5,950 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Meadowcreek and similar soils: 85 percent

##### Minor Components

Blossberg loam: 0 to 10 percent

Beaverton loam moderately wet: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 504A—Meadowcreek silty clay loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,000 to 5,000 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Meadowcreek and similar soils: 85 percent

##### Minor Components

Bonebasin loam: 0 to 5 percent

Rivra sandy loam: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**503A—Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes****Setting***Landform:*

- Meadowcreek—Flood plains
- Rivra—Flood plains

*Slope:*

- Meadowcreek—0 to 2 percent
- Rivra—0 to 2 percent

*Elevation:* 4,000 to 4,400 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Meadowcreek and similar soils: 55 percent  
Rivra and similar soils: 30 percent

**Minor Components**

Bonebasin loam: 0 to 6 percent  
Fairway loam: 0 to 5 percent  
Ryell sandy loam: 0 to 4 percent

**Major Component Description****Meadowcreek**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Available water capacity:* Mainly 4.7 inches

**Rivra**

*Surface layer texture:* Gravelly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**513A—Meadowcreek-Bonebasin complex, 0 to 2 percent slopes****Setting***Landform:*

- Meadowcreek—Flood plains
- Bonebasin—Flood plains

*Slope:*

- Meadowcreek—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 4,000 to 5,250 feet*Mean annual precipitation:* 12 to 18 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Meadowcreek and similar soils: 60 percent  
Bonebasin and similar soils: 25 percent

**Minor Components**

Fairway loam: 0 to 5 percent  
Lamoose loam: 0 to 5 percent  
Nesda loam: 0 to 5 percent

**Major Component Description****Meadowcreek**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.3 inches

**Bonebasin**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## 603A—Meadowcreek-Rivra complex, 0 to 2 percent slopes

### Setting

#### Landform:

- Meadowcreek—Flood plains
- Rivra—Flood plains

#### Slope:

- Meadowcreek—0 to 2 percent
- Rivra—0 to 2 percent

*Elevation:* 4,000 to 4,600 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Meadowcreek and similar soils: 55 percent

Rivra and similar soils: 30 percent

#### Minor Components

Bonebasin loam: 0 to 5 percent

Fairway loam: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

### Major Component Description

#### Meadowcreek

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.1 inches

#### Rivra

*Surface layer texture:* Gravelly sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Meagher Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans, escarpments, and stream terraces

*Parent material:* Alluvium or colluvium

*Slope range:* 0 to 35 percent

*Elevation range:* 4,500 to 6,150 feet

*Annual precipitation:* 12 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Meagher loam, in an area of Anceney-Trimad-Meagher complex, 15 to 60 percent slopes, in an area of rangeland, 2,200 feet south and 1,900 feet west of the northeast corner of sec. 11, T. 2 S., R. 1 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2)

loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt—6 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common faint clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bk1—19 to 31 inches; very pale brown (10YR 7/3) loam, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; violently effervescent, moderately alkaline; clear smooth boundary.

2Bk2—31 to 60 inches; light gray (10YR 7/2) very cobbly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 10 inches  
*Depth to the Bk horizon:* 11 to 20 inches  
*Depth to loamy-skeletal material:* 20 to 35 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles  
 Reaction: pH 6.6 to 7.8

#### Bt horizon

Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 3 or 4  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles  
 Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Hue: 10YR or 2.5Y  
 Value: 7 or 8 dry; 5 or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy loam or loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.4 to 8.4

#### 2Bk2 horizon

Hue: 10YR or 2.5Y  
 Value: 7 or 8 dry; 5, 6, or 7 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy loam, loam, or sandy clay loam  
 Clay content: 10 to 25 percent  
 Content of rock fragments: 35 to 70 percent—5 to 35 percent cobbles; 30 to 35 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.9 to 8.4

### 257B—Meagher cobbly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 5,550 to 6,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Meagher and similar soils: 90 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent  
 Martinsdale loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 257C—Meagher cobbly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 5,500 to 5,950 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Meagher and similar soils: 90 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent  
 Martinsdale loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 57C—Meagher loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,500 to 5,700 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Meagher and similar soils: 85 percent

##### Minor Components

Anceney cobbly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Soils with slopes more 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 57D—Meagher loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,750 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

##### Major Components

Meagher and similar soils: 90 percent

##### Minor Components

Anceney cobbly loam: 0 to 8 percent

Soils with slopes more than 15 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 752E—Meagher-Shawmut-Bowery complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Meagher—Escarpments
- Shawmut—Escarpments
- Bowery—Escarpments

*Slope:*

- Meagher—15 to 35 percent
- Shawmut—15 to 45 percent
- Bowery—15 to 35 percent

*Elevation:* 4,600 to 6,150 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Meagher and similar soils: 45 percent

Shawmut and similar soils: 35 percent

Bowery and similar soils: 10 percent

##### Minor Components

Shawmut stony loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

## Major Component Description

### Meagher

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.4 inches

### Shawmut

*Surface layer texture:* Cobbly 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 4.0 inches

### Bowery

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Mooseflat Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Permeability:* Moderate above the 2Cg horizon and rapid in the 2Cg horizon  
*Landform:* Flood plains and drainageways  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Elevation range:* 5,300 to 6,650 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaquolls

## Typical Pedon

Mooseflat silty clay loam, in an area of Beehive-Mooseflat complex, 0 to 4 percent slopes, occasional flooding, in an area of forest land, 2,400 feet north and 2,500 feet east of the southwest corner of sec. 36, T. 6 S., R. 3 E.

Oe—0 to 2 inches; very dark gray (10YR 3/1) mucky peat, dark gray (10YR 4/1) dry; neutral (pH 7.0); clear smooth boundary.

A—2 to 10 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine faint yellowish brown (10YR 5/6) redox concentrations; moderate fine subangular blocky structure; hard, very friable, very sticky, and very plastic; many very fine, common fine, and few coarse roots; neutral; clear smooth boundary.

Bg1—10 to 16 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 5/1) dry; many medium distinct yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, very friable, moderately sticky, and moderately plastic; many very fine, common fine, and few medium roots; slightly alkaline; clear wavy boundary.

Bg2—16 to 22 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) dry; many medium distinct yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; slightly alkaline; clear wavy boundary.

2Cg—22 to 60 inches; variegated very gravelly loamy coarse sand; massive; loose, very friable, nonsticky, and nonplastic; few very fine and fine roots; 15 percent cobbles and 35 percent pebbles; slightly effervescent; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 19 inches

*Depth to seasonal high water table:* Ponded to 12 inches

### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 10 percent cobbles and pebbles

Reaction: pH 5.6 to 7.3

#### *Bg horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 0, 1, or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent cobbles and pebbles

Reaction: pH 6.1 to 7.8

#### *2Cg horizon*

Hue: 10YR, 2.5Y, or variegated

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 0, 1, or 2

Texture: Sand, loamy sand, coarse sand, or loamy coarse sand

Clay content: 2 to 12 percent

Content of rock fragments: 35 to 70 percent—15 to 50 percent stones and cobbles; 20 to 35 percent pebbles

Reaction: pH 5.6 to 7.8

### **Musselshell Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Relict stream terraces, hills, and escarpments

*Parent material:* Alluvium or limestone colluvium

*Slope range:* 0 to 35 percent

*Elevation range:* 4,100 to 5,500 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-loamy, carbonatic, frigid  
Aridic Calcustepts

#### **Typical Pedon**

Musselshell loam, in an area of Crago-Musselshell complex, 0 to 4 percent slopes, in an area of cropland, 600 feet south and 1,200 feet west of the northeast corner of sec. 19, T. 1 N., R. 2 E.

Ap1—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles;

strongly effervescent; slightly alkaline; clear smooth boundary.

Ap2—4 to 7 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—7 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent pebbles; disseminated lime, few fine threads of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—16 to 33 inches; white (10YR 8/2) gravelly loam, very pale brown (10YR 7/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; 10 percent cobbles and 25 percent pebbles; common distinct lime coatings on rock fragments, few prominent lime casts on undersides of rock fragments; violently effervescent; moderately alkaline; clear wavy boundary.

2Ck—33 to 60 inches; white (10YR 8/2) very gravelly loam, very pale brown (10YR 7/3) moist; massive; hard, friable, slightly sticky, and slightly plastic; few very fine roots; 10 percent cobbles and 35 percent pebbles; common distinct lime coatings on rock fragments, few prominent lime casts 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:* 4 to 8 inches

#### *Ap horizons*

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### *Bk horizons*

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4  
 Texture: Loam or sandy loam  
 Clay content: 10 to 18 percent  
 Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles  
 Calcium carbonate equivalent: 40 to 60 percent  
 Reaction: pH 7.9 to 8.4

**2Ck horizon**

Hue: 10YR or 2.5Y  
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or sandy 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: 40 to 60 percent  
 Reaction: pH 7.9 to 8.4

### **225C—Musselshell cobbly loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 2 to 8 percent  
*Elevation:* 4,100 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### **Composition**

##### **Major Components**

Musselshell and similar soils: 85 percent

##### **Minor Components**

Crago very cobbly loam: 0 to 5 percent  
 Musselshell very cobbly loam: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **225D—Musselshell cobbly loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,150 to 5,050 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### **Composition**

##### **Major Components**

Musselshell and similar soils: 85 percent

##### **Minor Components**

Crago very cobbly loam: 0 to 5 percent  
 Musselshell very stony loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **25B—Musselshell loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,100 to 5,250 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### **Composition**

##### **Major Components**

Musselshell and similar soils: 85 percent

##### **Minor Components**

Crago cobbly loam: 0 to 10 percent  
 Soils with slopes more than 4 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 325E—Musselshell very cobbly loam, 15 to 35 percent slopes, very stony

#### Setting

*Landform:* Escarpments  
*Slope:* 15 to 35 percent  
*Elevation:* 4,300 to 4,950 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Musselshell and similar soils: 85 percent

##### Minor Components

Crago very stony loam: 0 to 5 percent  
 Musselshell bouldery loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Very cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 425E—Musselshell-Pensore, stony complex, 15 to 35 percent slopes

#### Setting

##### Landform:

- Musselshell—Hills
- Pensore—Hills

##### Slope:

- Musselshell—15 to 35 percent
- Pensore—15 to 35 percent

*Elevation:* 4,150 to 5,150 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Musselshell and similar soils: 50 percent  
 Pensore and similar soils: 35 percent

##### Minor Components

Crago stony loam: 0 to 8 percent  
 Soils with slopes more than 35 percent: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Musselshell

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

##### Pensore

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Nesda Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Rapid

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 6 percent

*Elevation range:* 4,300 to 5,800 feet

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 80 to 110 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid  
Fluventic Haplustolls

**Typical Pedon**

Nesda loam, in an area of Sudworth-Nesda loams, 0 to 2 percent slopes, in an area of hayland, 2,500 feet north and 2,100 feet west of the southeast corner of sec. 14, T. 2 S., R. 4 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine roots; 5 percent pebbles; neutral; clear smooth boundary.

AB—7 to 11 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few fine roots; 10 percent pebbles; moderately alkaline; clear smooth boundary.

2C1—11 to 19 inches; brown (10YR 5/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine roots; 15 percent cobbles and 55 percent pebbles; slightly alkaline; gradual smooth boundary.

2C2—19 to 60 inches; variegated extremely gravelly coarse sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 45 percent pebbles; slightly alkaline.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 12 and 35 inches

*Mollic epipedon thickness:* 10 to 16 inches

**Ap and AB horizons**

Hue: 10YR, 2.5Y, or 5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Loam or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 5 to 30 percent—0 to

10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 8.4

**2C horizons**

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to

20 percent cobbles; 35 to 60 percent pebbles

Reaction: pH 7.4 to 7.8

**207B—Nesda loam, 2 to 6 percent slopes****Setting**

*Landform:* Stream terraces

*Slope:* 2 to 6 percent

*Elevation:* 4,500 to 5,550 feet

*Mean annual precipitation:* 18 to 22 inches

*Frost-free period:* 80 to 95 days

**Composition****Major Components**

Nesda and similar soils: 90 percent

**Minor Components**

Nesda very gravelly loam: 0 to 5 percent

Sudworth 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### ***Newtman Series***

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Permeability:* Moderately slow

*Landform:* Stream terraces

*Parent material:* Mixed alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,100 to 5,200 feet

*Annual precipitation:* 12 to 19 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, calcareous, frigid Histic Humaquepts

### **Typical Pedon**

Newtman mucky peat, in an area of Tetonview-Newtman complex, 0 to 2 percent slopes, in an area of pasture, 1,400 feet south and 1,900 feet west of the northeast corner of sec. 15, T. 1 N., R. 4 E.

Oe—0 to 9 inches; very dark gray (10YR 3/1) mucky peat, black (10YR 2/1) moist; few fine prominent strong brown (7.5YR 5/8) redox concentrations; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; strongly effervescent, moderately alkaline; clear smooth boundary.

A—9 to 15 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine granular; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; slightly effervescent; slightly alkaline; clear wavy boundary.

Cg—15 to 28 inches; light gray (5Y 6/1) silty clay loam, gray (5Y 5/1) moist; massive; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

2Cg—28 to 60 inches; light brownish gray (10YR 6/2) very gravelly sandy clay loam, dark gray (5Y 4/1) moist; massive; hard, firm, slightly sticky, and slightly plastic; 10 percent cobbles and 35 percent pebbles; slightly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Histic epipedon thickness:* 8 to 16 inches

*Depth to seasonal high water table:* Ponded to 12 inches

*Depth to the 2C horizon:* 28 to 38 inches

### *Oe horizon*

Hue: 10YR or N

Value: 2 or 3 dry

Reaction: pH 7.4 to 8.4

### *A horizon*

Hue: 10YR or N

Value: 3, 4, 5, or 6 dry; 2, 3 or 4 moist

Chroma: 0, 1, or 2

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

### *Cg horizon*

Hue: 5Y, 2.5Y, 5BG, or N

Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 0, 1, or 2

Texture: Silty clay loam, loam, or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

### *2Cg horizon*

Hue: 10YR, 2.5Y, 5Y, or N

Value: 4, 5, or 6 dry; 2, 3, or 4 moist

Chroma: 0, 1, or 2

Texture: Sandy clay loam, sandy loam, clay loam, or loam

Clay content: 18 to 30 percent

Content of rock fragments: 25 to 60 percent—5 to 15 percent cobbles; 20 to 45 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

### **557A—Newtman mucky peat, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,100 to 4,950 feet  
*Mean annual precipitation:* 12 to 18 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Newtman and similar soils: 90 percent

#### Minor Components

Organics more than 16 inches: 0 to 5 percent  
 Tetonview silt loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 558C—Newtman-Amsterdam complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Newtman—Stream terraces
- Amsterdam—Stream terraces

*Slope:*

- Newtman—2 to 4 percent
- Amsterdam—4 to 8 percent

*Elevation:* 4,950 to 5,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Newtman and similar soils: 50 percent  
 Amsterdam and similar soils: 35 percent

#### Minor Components

Tetonview silt loam: 0 to 10 percent  
 Beanlake gravelly loam: 0 to 5 percent

### Major Component Description

#### Newtman

*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:* Forest land  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.2 inches

#### Amsterdam

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Norbert Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Very slow  
*Landform:* Escarpments  
*Parent material:* Interbedded sandstone and shale residuum  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,700 to 6,350 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 40 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Clayey, smectitic, calcareous, frigid, shallow Typic Ustorthents

### Typical Pedon

Norbert silty clay, in an area of Norbert-Bacbuster complex, 15 to 60 percent slopes, in an area of rangeland, 900 feet south and 2,200 feet east of the northwest corner of section. 2, T. 4 N., R. 5 E.

A—0 to 3 inches; gray (10YR 6/1) silty clay, gray (10YR 5/1) moist; moderate fine granular

structure, very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; slightly effervescent; slightly alkaline; clear smooth boundary.

**Bky**—3 to 13 inches; gray (10YR 6/1) silty clay, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; 5 percent channers; few fine masses of lime and gypsum; strongly effervescent; slightly alkaline; gradual wavy boundary.

**Cr**—13 to 60 inches; semiconsolidated shale; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Cr horizon:* 10 to 20 inches

#### A horizon

Hue: 2.5Y or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

#### Bky horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Clay content: 50 to 60 percent

Content of rock fragments: 0 to 10 percent pebbles

Gypsum: 1 to 3 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 715F—Norbert-Bacbuster complex, 15 to 60 percent slopes

### Setting

#### Landform:

- Norbert—Escarpments
- Bacbuster—Escarpments

#### Slope:

- Norbert—15 to 60 percent
- Bacbuster—15 to 35 percent

*Elevation:* 4,700 to 6,350 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Norbert and similar soils: 60 percent

Bacbuster and similar soils: 30 percent

#### Minor Components

Castner channery loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Norbert

*Surface layer texture:* Silty clay

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

#### Bacbuster

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Nuley Series

*Depth class:* Deep

*Drainage class:* Well drained

*Permeability:* Moderate in the upper 24 inches and rapid below

*Landform:* Hills and bedrock-floored plains

*Parent material:* Gneiss and schist residuum

*Slope range:* 4 to 45 percent

*Elevation range:* 4,300 to 5,350 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Calcic Argiustolls

### Typical Pedon

Nuley clay loam, 4 to 8 percent slopes, in an area of rangeland, 300 feet north and 200 feet east of the southwest corner of sec. 15, T. 1 S., R. 1 W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky, and slightly plastic; many fine and few coarse roots; neutral; abrupt smooth boundary.

Bt1—6 to 9 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine roots; common to many distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—9 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; few distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bk—15 to 24 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine roots; 5 percent pebbles; disseminated lime, few fine masses of lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

2C—24 to 50 inches; olive gray (5Y 4/2) gravelly coarse sand, dark olive gray (5Y 3/2) moist; single grain; loose, nonsticky, and nonplastic; few fine roots; 25 percent pebbles; slightly effervescent; moderately alkaline; gradual irregular boundary.

R—50 inches; gneiss bedrock.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to bedrock:* 40 to 60 inches

*Depth to the Bk horizon:* 10 to 15 inches

#### Ap horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam or sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 5 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

#### 2C horizon

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loamy coarse sand or coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 25 to 35 percent pebbles

Reaction: pH 7.4 to 8.4

### 45C—Nuley clay loam, 4 to 8 percent slopes

#### Setting

*Landform:* Bedrock-floored plains

*Slope:* 4 to 8 percent

*Elevation:* 4,550 to 5,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Nuley and similar soils: 85 percent

##### Minor Components

Nuley sandy loam: 0 to 5 percent

Rentsac gravelly sandy loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Deep (40 to 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 45D—Nuley clay loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Elevation:* 4,550 to 5,300 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Nuley and similar soils: 85 percent

#### Minor Components

Nuley sandy loam: 0 to 5 percent  
 Rentsac gravelly sandy loam: 0 to 5 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Deep (40 to 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 745E—Nuley-Rentsac-Rock outcrop complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Nuley—Hills
- Rentsac—Hills
- Rock outcrop—Hills

#### Slope:

- Nuley—15 to 45 percent
- Rentsac—15 to 45 percent

*Elevation:* 4,300 to 5,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Nuley and similar soils: 50 percent  
 Rentsac and similar soils: 25 percent  
 Rock outcrop: 15 percent

#### Minor Components

Breton coarse sandy loam: 0 to 5 percent  
 Shurley flaggy sandy loam: 0 to 5 percent

### Major Component Description

#### Nuley

*Surface layer texture:* Sandy loam  
*Depth class:* Deep (40 to 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

#### Rentsac

*Surface layer texture:* Gravelly sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

#### Rock outcrop

*Definition:* Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### ***Nythar Series***

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Permeability:* Moderate

*Landform:* Flood plains and drainageways

*Parent material:* Alluvium

*Slope range:* 0 to 6 percent

*Elevation range:* 4,150 to 6,300 feet

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 80 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Cumulic Endoaquolls

### Typical Pedon

Nythar loam, in an area of Enbar-Nythar loams, 0 to 4 percent slopes, in an area of pasture, 1,900 feet south and 1,200 feet east of the northwest corner of sec. 19, T. 2 S., R. 6 E.

A—0 to 8 inches; black (10YR 2/1) loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; slightly alkaline; clear smooth boundary.

Bg—8 to 33 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; hard, very friable, moderately sticky, and moderately plastic; weak fine subangular blocky structure; common very fine and few fine and medium roots; neutral; clear wavy boundary.

Cg1—33 to 41 inches; black (10YR 2/1) stratified loam and sandy loam, dark grayish brown (10YR 4/2) dry; massive; hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine roots; neutral; clear wavy boundary.

Cg2—41 to 60 inches; very dark gray (10YR 3/1) sandy loam with thin strata of loamy coarse sand, dark grayish brown (10YR 4/2) dry; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine roots; neutral.

## Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 24 to 60 inches

*Depth to seasonal high water table:* Ponded to 12 inches

### *A horizon*

Hue: 2.5Y or 10YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

### *Bg horizon*

Hue: 2.5Y, 10YR, or 5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.6 to 7.3

### *Cg horizons*

Hue: 2.5Y or 10YR

Value: 4, 5, 6, or 7 dry; 2, 3, or 4 moist

Chroma: 1 or 2

Texture: Silty clay loam, loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.6 to 7.3

### ***Ouselfal Series***

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Mountains and hills

*Parent material:* Interbedded sandstone or shale residuum

*Slope range:* 8 to 60 percent

*Elevation range:* 6,100 to 8,800 feet

*Annual precipitation:* 25 to 30 inches

*Annual air temperature:* 32 to 37 degrees F

*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Clayey-skeletal, smectitic Eutric Haplocryalfs

### Typical Pedon

Ouselfal very channery sandy loam, in an area of Yellowmule-Ouselfal complex, 8 to 25 percent slopes, in an area of forest land, 2,200 feet north and 2,300 feet west of the southeast corner of sec. 4, T. 7 S., R. 3 E.

- Oi—0 to 2 inches; forest litter of slightly decomposed leaves, needles, and twigs.
- E1—2 to 7 inches; light brownish gray (10YR 6/2) very channery sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; common very fine and few fine and medium pores; 5 percent flagstones and 35 percent channers; strongly acid; clear smooth boundary.
- E2—7 to 19 inches; light gray (10YR 7/2) very channery sandy loam, brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few medium roots; common very fine and few fine and medium pores; 10 percent flagstones and 35 percent channers; moderately acid; clear wavy boundary.
- Bt—19 to 25 inches; light gray (10YR 7/2) extremely gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few medium roots; common very fine and few fine and medium pores; 20 percent cobbles and 45 percent pebbles; slightly acid; clear wavy boundary.
- Cr1—25 to 34 inches; semiconsolidated shale.
- Cr2—34 to 40 inches; semiconsolidated, fine-grained sandstone.
- R—40 inches; hard fine-grained sandstone.

### Range in Characteristics

*Soil temperature:* 34 to 38 degrees.

*Moisture control section:* Between 4 and 12 inches

*Depth to the R horizon:* 20 to 40 inches

#### E1 horizon

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 12 to 20 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 15 percent flagstones; 20 to 45 percent channers

Reaction: pH 5.1 to 6.0

#### E2 horizon

Value: 6 or 7 dry; 3, 4 or 5 moist

Chroma: 1, 2, or 3

Clay content: 12 to 20 percent

Content of rock fragments: 35 to 60 percent—10 to 25 percent flagstones; 20 to 40 percent channers

Reaction: pH 5.1 to 6.5

#### Bt horizon

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 40 to 70 percent—10 to 25 percent cobbles or flagstones; 25 to 50 percent pebbles or channers

Reaction: pH 5.1 to 6.5

## 496E—Ouselfal, very stony-Bridger-Redlodge complex, 4 to 45 percent slopes

### Setting

#### Landform:

- Ouselfal—Hills
- Bridger—Drainageways
- Redlodge—Closed depressions

#### Slope:

- Ouselfal—15 to 45 percent
- Bridger—15 to 45 percent
- Redlodge—4 to 6 percent

*Elevation:* 6,100 to 7,650 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Ouselfal and similar soils: 50 percent

Bridger and similar soils: 20 percent

Redlodge and similar soils: 15 percent

#### Minor Components

Yellowmule loam: 0 to 10 percent

Soils with a water table at 2.5 to 4 feet: 0 to 5 percent

### Major Component Description

#### Ouselfal

*Surface layer texture:* Very flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

### **Bridger**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

### **Redlodge**

*Surface layer texture:* Silty clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **592F—Ouselfal, very stony-Yellowmule complex, 35 to 60 percent slopes**

### **Setting**

*Landform:*

- Ouselfal—Mountains
- Yellowmule—Mountains

*Slope:*

- Ouselfal—35 to 60 percent
- Yellowmule—35 to 60 percent

*Elevation:* 7,800 to 8,800 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 30 to 55 days

### **Composition**

#### **Major Components**

Ouselfal and similar soils: 50 percent

Yellowmule and similar soils: 35 percent

#### **Minor Components**

Cowood channery sandy loam: 0 to 10 percent

Rock outcrop: 0 to 5 percent

## **Major Component Description**

### **Ouselfal**

*Surface layer texture:* Very flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

### **Yellowmule**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **492F—Ouselfal-Yellowmule complex, 35 to 60 percent slopes**

### **Setting**

*Landform:*

- Ouselfal—Mountains
- Yellowmule—Mountains

*Slope:*

- Ouselfal—35 to 60 percent
- Yellowmule—35 to 60 percent

*Elevation:* 6,400 to 8,000 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### **Composition**

#### **Major Components**

Ouselfal and similar soils: 50 percent

Yellowmule and similar soils: 35 percent

#### **Minor Components**

Cowood channery sandy loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

## Major Component Description

### Ouselfal

*Surface layer texture:* Very channery sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

### Yellowmule

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Paddy Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Mountains  
*Parent material:* Residuum from hard shale and argillite  
*Slope range:* 15 to 45 percent  
*Elevation range:* 5,450 to 6,650 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy, mixed, superactive Lithic Haplocryolls

## Typical Pedon

Paddy clay loam, in an area of Uinta-Paddy complex, cool, 15 to 45 percent slopes, in an area of forest land, 200 feet north and 400 feet west of the southeast corner of sec. 14, T. 5 N., R. 4 E.

Oi—0 to 1 inch; slightly decomposed bark, grass, needles, roots, and twigs.

A—1 to 4 inches; dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; common very fine pores; 5 percent pebbles; neutral; abrupt smooth boundary.  
 Bw1—4 to 10 inches; weak red (2.5YR 4/2) clay loam, dusky red (2.5YR 3/2) moist, moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; common very fine and fine pores; 10 percent pebbles; slightly acid; clear smooth boundary.  
 Bw2—10 to 16 inches; reddish brown (2.5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium roots; common fine pores; 5 percent cobbles and 10 percent pebbles; moderately acid; clear smooth boundary.  
 R—16 inches; thinly bedded hard red shale.

## Range in Characteristics

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 10 inches  
*Depth to the R horizon:* 10 to 20 inches

### A horizon

Hue: 5YR or 2.5YR  
 Chroma: 2 or 3  
 Clay content: 27 to 32 percent  
 Content of rock fragments: 5 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.3

### Bw1 horizon

Hue: 2.5YR or 5YR  
 Value: 4 or 5 dry  
 Chroma: 2 or 3  
 Texture: Clay loam or loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent pebbles  
 Reaction: pH 6.1 to 6.5

### Bw2 horizon

Hue: 2.5YR or 5YR  
 Value: 4 or 5 dry  
 Chroma: 3 or 4  
 Texture: Clay loam or loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 10 to 20 percent—0 to 5 percent cobbles; 10 to 15 percent pebbles  
 Reaction: pH 5.6 to 6.0

**Patouza Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Elevation range:* 4,050 to 5,300 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine, smectitic, frigid Torrertic  
Argiustolls

**Typical Pedon**

Patouza clay, 0 to 6 percent slopes, in an area of hayland, 2,000 feet north and 900 feet east of the southwest corner of sec. 11, T. 1 N., R. 1 E.

**Ap**—0 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine and common medium roots; neutral; clear wavy boundary.

**Bt1**—4 to 11 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; few slickensides; neutral; clear wavy boundary.

**Bt2**—11 to 16 inches; pale brown (10YR 6/3) clay, grayish brown (10YR 5/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; few slickensides; slightly effervescent; moderately alkaline; clear wavy boundary.

**Btk**—16 to 24 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; few distinct clay films on faces of peds and lining pores; common

fine masses and seams of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**Bk**—24 to 60 inches; pale brown (10YR 6/3) stratified silty clay loam and fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses and seams of lime; strongly effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to the Bk horizon:* 21 to 30 inches

**Ap horizon**

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

**Bt horizons**

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay or silty clay

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 8.4

**Btk horizon**

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

**Bk horizon**

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Stratified sandy loam, fine sandy loam, sandy clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

**23B—Patouza clay, 0 to 6 percent slopes****Setting**

*Landform:* Alluvial fans

*Slope:* 0 to 6 percent

*Elevation:* 4,050 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Patouza and similar soils: 90 percent

**Minor Components**

Varney sandy clay loam: 0 to 10 percent

**Major Component Description**

*Surface layer texture:* Clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**723C—Patouza-Abor complex,  
2 to 8 percent slopes****Setting**

*Landform:*

- Patouza—Alluvial fans

- Abor—Hills

*Slope:*

- Patouza—2 to 8 percent

- Abor—2 to 8 percent

*Elevation:* 4,150 to 5,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Patouza and similar soils: 60 percent

Abor and similar soils: 25 percent

**Minor Components**

Soils less than 20 inches to shale: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Patouza**

*Surface layer texture:* Clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.4 inches

**Abor**

*Surface layer texture:* Cobbly clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, clayey sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Pensore Series**

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills

*Parent material:* Limestone residuum

*Slope range:* 4 to 70 percent

*Elevation range:* 3,950 to 5,750 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid  
Lithic Calcustepts

**Typical Pedon**

Pensore gravelly loam, in an area of Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes, in an

area of rangeland, 1,320 feet north and 2,300 feet west of the southeast corner of sec. 1, T. 1 S., R. 1 W.

A—0 to 5 inches; grayish brown (10YR 5/2) gravelly loam, dark brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine roots; 10 percent angular cobbles and 20 percent angular pebbles; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—5 to 16 inches; very pale brown (10YR 7/3) very cobbly loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine roots; 30 percent angular cobbles and 30 percent angular pebbles; common faint lime coatings on coarse fragments; common prominent lime casts on undersides of coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

R—16 inches; hard limestone bedrock with a few fractures.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to bedrock:* 10 to 20 inches

*Depth to the Bk horizon:* 3 to 7 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 10 to 25 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 10 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 45 percent

Reaction: pH 7.9 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 6 or 7 moist

Chroma: 2, 3, or 4

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 60 percent—20 to 30 percent angular cobbles; 15 to 30 percent angular pebbles

Calcium carbonate equivalent: 40 to 60 percent including coarse fragments less than  $\frac{3}{4}$  inch in size

Reaction: pH 7.9 to 8.4

## 716E—Pensore-Brocko-Rock outcrop complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Pensore—Hills
- Brocko—Hills
- Rock outcrop—Hills

#### Slope:

- Pensore—15 to 45 percent
- Brocko—15 to 35 percent

*Elevation:* 3,950 to 5,100 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Pensore and similar soils: 40 percent

Brocko and similar soils: 30 percent

Rock outcrop: 15 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Brocko stony loam: 0 to 5 percent

### Major Component Description

#### Pensore

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.5 inches

#### Brocko

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.0 inches

#### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 816E—Pensore-Rock outcrop complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Pensore—Hills
- Rock outcrop—Hills

*Slope:* 15 to 45 percent

*Elevation:* 4,000 to 5,750 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Pensore and similar soils: 60 percent  
Rock outcrop: 30 percent

##### Minor Components

Crago stony loam: 0 to 5 percent  
Soils with slopes more than 45 percent: 0 to 5 percent

#### Major Component Description

##### Pensore

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.5 inches

##### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 816D—Pensore-Rock outcrop complex, 4 to 15 percent slopes

#### Setting

*Landform:*

- Pensore—Hills
- Rock outcrop—Hills

*Slope:* 4 to 15 percent

*Elevation:* 4,000 to 5,650 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Pensore and similar soils: 60 percent  
Rock outcrop: 30 percent

##### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

#### Major Component Description

##### Pensore

*Surface layer texture:* Gravelly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.5 inches

##### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 816G—Pensore-Rock outcrop complex, 45 to 70 percent slopes

#### Setting

*Landform:*

- Pensore—Hills
- Rock outcrop—Hills

*Slope:* 45 to 70 percent

*Elevation:* 4,100 to 5,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Pensore and similar soils: 60 percent  
Rock outcrop: 30 percent

##### Minor Components

Crago stony loam: 0 to 10 percent

## Major Component Description

### Pensores

*Surface layer texture:* Very gravelly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.3 inches

### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Philipsburg Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Hills and relict stream terraces  
*Parent material:* Alluvium  
*Slope range:* 4 to 25 percent  
*Elevation range:* 5,000 to 7,350 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive  
 Ustic Argicryolls

## Typical Pedon

Philipsburg loam, 8 to 25 percent slopes, in an area of rangeland, 700 feet north and 750 feet east of the southwest corner of sec. 30, T. 5 N., R. 6 E.

Oi—0 to 1 inch; slightly decomposed organic material.

A—1 to 7 inches; dark reddish brown (5YR 3/2) loam, dark reddish brown (5YR 2.5/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

AB—7 to 15 inches; dark reddish brown (5YR 3/2) loam, dark reddish brown (5YR 2.5/2) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—15 to 28 inches; reddish brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common prominent clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—28 to 60 inches; reddish brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; few fine masses of lime; strongly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 8 to 15 inches  
*Depth to the Bk horizon:* 20 to 30 inches

### A horizon

Hue: 5YR, 7.5YR, or 10YR  
 Value: 3, 4, or 5 dry; 2.5 or 3 moist  
 Chroma: 1, 2, or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.3

### AB horizon

Hue: 5YR, 7.5YR, or 10YR  
 Value: 3, 4, or 5 dry; 2.5 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.3

### Bt horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR  
 Value: 5 or 6 dry; 3, 4, or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Clay loam or loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 5 to 30 percent—0 to 10 percent cobbles; 5 to 20 percent pebbles  
 Reaction: pH 6.6 to 7.8

### Bk horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR  
 Value: 4, 5, 6, or 7 dry; 3, 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Clay loam or loam

Clay content: 20 to 30 percent  
 Content of rock fragments: 10 to 35 percent—5 to 15 percent cobbles; 5 to 25 percent pebbles  
 Calcium carbonate equivalent: 15 to 20 percent  
 Reaction: pH 7.9 to 8.4

### **82E—Philipsburg loam, 8 to 25 percent slopes**

#### **Setting**

*Landform:* Hills  
*Slope:* 8 to 25 percent  
*Elevation:* 5,000 to 7,350 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Philipsburg and similar soils: 85 percent

##### **Minor Components**

Adel loam: 0 to 5 percent  
 Libeg stony loam: 0 to 5 percent  
 Soils with slopes more than 25 percent: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **482C—Philipsburg-Libeg complex, 4 to 8 percent slopes**

#### **Setting**

*Landform:*

- Philipsburg—Relict stream terraces
- Libeg—Relict stream terraces

*Slope:*

- Philipsburg—4 to 8 percent
- Libeg—4 to 8 percent

*Elevation:* 5,750 to 6,800 feet

*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

#### **Composition**

##### **Major Components**

Philipsburg and similar soils: 50 percent  
 Libeg and similar soils: 35 percent

##### **Minor Components**

Adel loam: 0 to 5 percent  
 Libeg very stony loam: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent

#### **Major Component Description**

##### **Philipsburg**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.9 inches

##### **Libeg**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Poin Series**

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid  
*Landform:* Hills  
*Parent material:* Gneiss and schist residuum  
*Slope range:* 4 to 45 percent  
*Elevation range:* 5,000 to 7,300 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Lithic Haplocryolls

### Typical Pedon

Poin very cobbly coarse sandy loam, in an area of Barbarella-Poin, stony-Bavdark complex, 15 to 45 percent slopes, in an area of rangeland, 1,400 feet north and 1,500 feet east of the southwest corner of sec. 25, T. 3 S., R. 3 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) very cobbly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and common fine roots; common very fine and fine tubular pores; 25 percent angular cobbles and 15 percent pebbles; moderately acid; clear smooth boundary.

Bw—7 to 15 inches; brown (10YR 5/3) very cobbly coarse sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and few fine roots; common very fine and fine tubular pores; 30 percent angular cobbles and 30 percent pebbles; slightly acid; clear wavy boundary.

Cr—15 to 19 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) highly weathered gneiss bedrock; slightly acid.

R—19 inches; hard gneiss bedrock.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to bedrock:* 10 to 20 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 5.6 to 7.3

#### Bw horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Sandy loam or coarse sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 45 to 65 percent—25 to 35 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

### Quagle Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Relict stream terraces

*Parent material:* Loess

*Slope range:* 0 to 45 percent

*Elevation range:* 4,200 to 5,500 feet

*Annual precipitation:* 14 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Typic Calcicustolls

### Typical Pedon

Quagle silt loam, in an area of Amsterdam-Quagle silt loams, 4 to 8 percent slopes, in an area of cropland, 800 feet south and 2,600 feet east of the northwest corner of sec. 31, T. 2 S., R. 3 E.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—6 to 9 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—9 to 23 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; many medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—23 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to the calcic horizon:* 6 to 10 inches

#### Ap horizon

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent  
Reaction: pH 7.4 to 8.4

*Bw horizon*

Value: 3, 4, or 5 moist; 4, 5, or 6 dry  
Chroma: 2 or 3  
Clay content: 18 to 25 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.9 to 8.4

*Bk horizons*

Value: 5 or 6 moist; 6 or 7 dry  
Chroma: 2, 3, or 4  
Clay content: 10 to 18 percent—4 to 10 percent  
clay size carbonates  
Content of rock fragments: 0 to 5 percent pebbles  
Calcium carbonate equivalent: 15 to 35 percent  
Reaction: pH 7.9 to 8.4

**51B—Quagle silt loam,  
0 to 4 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,200 to 5,250 feet  
*Mean annual precipitation:* 14 to 18 inches  
*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Quagle and similar soils: 85 percent

**Minor Components**

Amsterdam silt loam: 0 to 5 percent  
Brodyk silt loam: 0 to 5 percent  
Trimad cobbly loam: 0 to 3 percent  
Soils with slopes more 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:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**451C—Quagle-Brodyk silt loams,  
4 to 8 percent slopes**

**Setting**

*Landform:*

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

*Slope:*

- Quagle—4 to 8 percent
- Brodyk—4 to 8 percent

*Elevation:* 4,350 to 5,150 feet

*Mean annual precipitation:* 14 to 18 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Quagle and similar soils: 70 percent  
Brodyk and similar soils: 20 percent

**Minor Components**

Amsterdam silt loam: 0 to 8 percent  
Anceney cobbly loam: 0 to 2 percent

**Major Component Description**

**Quagle**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

**Brodyk**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Loess  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**451D—Quagle-Brodyk silt loams,  
8 to 15 percent slopes****Setting***Landform:*

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

*Slope:*

- Quagle—8 to 15 percent
- Brodyk—8 to 15 percent

*Elevation:* 4,300 to 5,300 feet

*Mean annual precipitation:* 14 to 18 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Quagle and similar soils: 60 percent

Brodyk and similar soils: 30 percent

**Minor Components**

Amsterdam silt loam: 0 to 8 percent

Anceney cobbly loam: 0 to 2 percent

**Major Component Description****Quagle**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

**Brodyk**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**451E—Quagle-Brodyk silt loams,  
15 to 45 percent slopes****Setting***Landform:*

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

*Slope:*

- Quagle—15 to 45 percent
- Brodyk—15 to 45 percent

*Elevation:* 4,200 to 5,400 feet

*Mean annual precipitation:* 14 to 18 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Quagle and similar soils: 50 percent

Brodyk and similar soils: 40 percent

**Minor Components**

Anceney cobbly loam: 0 to 5 percent

Beanlake gravelly loam: 0 to 5 percent

**Major Component Description****Quagle**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.6 inches

**Brodyk**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Loess

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Quigley Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Relict stream terraces, alluvial fans, hills, and escarpments  
*Parent material:* Alluvium, colluvium, or limestone alluvium  
*Slope range:* 1 to 60 percent  
*Elevation range:* 4,300 to 6,250 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Haplustolls

### Typical Pedon

Quigley loam, 8 to 15 percent slopes, in an area of rangeland, 100 feet south and 600 feet west of the northeast corner of sec. 36, T. 3 N., R. 3 E.

- A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, nonsticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.
- Bw—5 to 15 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common fine and few medium and coarse roots; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.
- Bk1—15 to 28 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 10 percent pebbles; common distinct lime coatings on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.
- Bk2—28 to 60 inches; very pale brown (10YR 7/3) gravelly loam; pale brown (10YR 6/3) moist; weak moderate subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; common distinct lime coatings

on rock fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 15 inches  
*Depth to the Bk horizon:* 7 to 15 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Texture: Loam or silt loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 0 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.3

#### Bw horizon

Value: 4 or 5 dry  
 Chroma: 2 or 3  
 Texture: Loam or clay loam  
 Clay content: 18 to 33 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Value: 5, 6, or 7 dry; 4 or 5 moist  
 Chroma: 1, 2, or 3  
 Texture: Loam or clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Value: 7 or 8 dry; 6 or 7 moist  
 Chroma: 1, 2, or 3  
 Texture: Loam or clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 10 to 30 percent—5 to 10 percent cobbles; 10 to 20 percent pebbles  
 Calcium carbonate equivalent: 15 to 40 percent  
 Reaction: pH 7.9 to 8.4

### 71C—Quigley loam, 4 to 8 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,400 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Quigley and similar soils: 85 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent  
 Beanlake gravelly loam: 0 to 5 percent  
 Martinsdale 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 71D—Quigley loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,550 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Quigley and similar soils: 85 percent

#### Minor Components

Anceney cobbly loam: 0 to 5 percent  
 Beanlake gravelly loam: 0 to 5 percent  
 Martinsdale 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:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 452B—Quigley-Beanlake complex, 0 to 4 percent slopes

#### Setting

*Landform:*

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

*Slope:*

- Quigley—1 to 4 percent
- Beanlake—0 to 4 percent

*Elevation:* 4,300 to 5,150 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Quigley and similar soils: 50 percent  
 Beanlake and similar soils: 40 percent

#### Minor Components

Martinsdale loam: 0 to 8 percent  
 Corbly cobbly sandy loam: 0 to 2 percent

### Major Component Description

#### Quigley

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

#### Beanlake

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 452E—Quigley-Beanlake loams, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Quigley—Escarpments
- Beanlake—Escarpments

##### *Slope:*

- Quigley—15 to 45 percent
- Beanlake—15 to 45 percent

*Elevation:* 4,400 to 5,700 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Quigley and similar soils: 50 percent

Beanlake and similar soils: 40 percent

##### Minor Components

Anceney cobbly loam: 0 to 5 percent

Bowery loam: 0 to 5 percent

#### Major Component Description

##### Quigley

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.0 inches

##### Beanlake

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 452C—Quigley-Beanlake loams, 4 to 8 percent slopes

#### Setting

##### *Landform:*

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

##### *Slope:*

- Quigley—4 to 8 percent
- Beanlake—4 to 8 percent

*Elevation:* 4,550 to 5,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Quigley and similar soils: 55 percent

Beanlake and similar soils: 35 percent

##### Minor Components

Meagher cobbly loam: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

#### Major Component Description

##### Quigley

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.0 inches

##### Beanlake

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 452D—Quigley-Beanlake loams, 8 to 15 percent slopes

### Setting

#### Landform:

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

#### Slope:

- Quigley—8 to 15 percent
- Beanlake—8 to 15 percent

*Elevation:* 4,500 to 5,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Quigley and similar soils: 70 percent

Beanlake and similar soils: 20 percent

#### Minor Components

Bowery loam: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

### Major Component Description

#### Quigley

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.0 inches

#### Beanlake

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Raynesford Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills

*Parent material:* Limestone alluvium

*Slope range:* 8 to 25 percent

*Elevation range:* 5,200 to 7,400 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-loamy, carbonatic Calcic Haplocryolls

### Typical Pedon

Raynesford loam, in an area of Raynesford, stony-Hanson, very stony complex, 8 to 25 percent slopes, in an area of rangeland, 2,400 feet south and 1,800 feet west of the northeast corner of sec. 7, T. 3 N., R. 4 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent limestone pebbles; neutral; clear smooth boundary.

A2—6 to 11 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent limestone pebbles; slightly alkaline; clear wavy boundary.

A3—11 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine and few medium roots; 5 percent limestone pebbles; slightly alkaline; clear smooth boundary.

Bk—15 to 60 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent limestone cobbles and 20 percent limestone pebbles; disseminated lime, common distinct lime coatings on coarse fragments, common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 12 to 16 inches

*Depth to the Bk horizon:* 8 to 20 inches

#### A1 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### A2 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

#### A3 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

#### Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 7 or 8 dry; 5 or 6 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles

Calcium carbonate equivalent: 40 to 50 percent

Reaction: pH 7.9 to 8.4

## 681E—Raynesford, stony-Hanson, very stony complex, 8 to 25 percent slopes

### Setting

#### *Landform:*

- Raynesford—Hills
- Hanson—Hills

#### *Slope:*

- Raynesford—8 to 25 percent
- Hanson—8 to 25 percent

*Elevation:* 5,200 to 7,400 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Raynesford and similar soils: 70 percent

Hanson and similar soils: 20 percent

#### Minor Components

Windham stony loam: 0 to 4 percent

Adel loam: 0 to 3 percent

Soils with slopes more than 25 percent: 0 to 3 percent

### Major Component Description

#### Raynesford

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.9 inches

#### Hanson

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Redchief Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Hills

*Parent material:* Sandstone colluvium

*Slope range:* 8 to 35 percent

*Elevation range:* 5,650 to 7,250 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Clayey-skeletal, smectitic Ustic Argicryolls

**Typical Pedon**

Redchief cobbly loam, 15 to 35 percent slopes, stony, in an area of rangeland, 1,600 feet south and 1,600 feet east of the northwest corner of sec. 33, T. 5 N., R. 7 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many fine vesicular pores; 10 percent cobbles and 5 percent pebbles; moderately acid; clear smooth boundary.

A2—6 to 10 inches; brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many fine vesicular pores; 25 percent cobbles and 10 percent pebbles; moderately acid; abrupt smooth boundary.

Bt1—10 to 19 inches; reddish brown (5YR 5/3) very cobbly clay loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common fine tubular pores; common distinct clay films on faces of peds; 20 percent cobbles and 20 percent pebbles; slightly acid; gradual smooth boundary.

Bt2—19 to 29 inches; reddish brown (5YR 5/3) very cobbly clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; few fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces

of ped; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; slightly acid; gradual smooth boundary.

Bt3—29 to 43 inches; reddish brown (5YR 5/4) very cobbly clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; few medium roots; common fine tubular pores; few distinct clay films on faces of peds; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; neutral; clear smooth boundary.

Bt4—43 to 60 inches; weak red (2.5YR 5/2) very cobbly clay, weak red (2.5YR 4/2) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky, and very plastic; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; neutral.

**Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

**A horizons**

Hue: 10YR or 7.5YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 35 percent—0 to 3 percent stones; 10 to 25 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 5.1 to 6.0

**Bt1 and Bt2 horizons**

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3, 4, 6, or 8

Texture: Clay or clay loam

Clay content: 35 to 60 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 5.1 to 6.5

**Bt3 and Bt4 horizons**

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, 6, or 8

Clay content: 40 to 60 percent

Content of rock fragments: 35 to 70 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 5.1 to 7.3

**284D—Redchief cobbly loam,  
8 to 15 percent slopes, stony**

**Setting**

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Elevation:* 5,800 to 7,200 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Redchief and similar soils: 90 percent

**Minor Components**

Copenhaver flaggy loam: 0 to 4 percent  
Soils with slopes more than 15 percent: 0 to 3 percent  
Bridger loam: 0 to 2 percent  
Rock outcrop: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**284E—Redchief cobbly loam,  
15 to 35 percent slopes, stony**

**Setting**

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 5,650 to 7,250 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Redchief and similar soils: 85 percent

**Minor Components**

Bridger loam: 0 to 5 percent  
Copenhaver flaggy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 4 percent  
Rock outcrop: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Redlodge Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Permeability:* Slow  
*Landform:* Drainageways and closed depressions  
*Parent material:* Alluvium  
*Slope range:* 4 to 6 percent  
*Elevation range:* 5,100 to 7,950 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Cumulic Cryaquolls

**Typical Pedon**

Redlodge silty clay loam, in an area of Bridger-Ouselfal, very stony-Redlodge complex, 4 to 15 percent slopes, in an area of forest land, 2,200 feet north and 1,200 feet west of the southeast corner of sec. 34, T. 6 S., R. 3 E.

Oa—0 to 7 inches; highly decomposed roots and organic matter; slightly acid; clear wavy boundary.  
A—7 to 22 inches; black (N 2.5/) silty clay, very dark gray (N 3/) dry; common fine distinct brown (7.5YR 4/4) redox concentrations; weak medium subangular blocky structure; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; slightly acid; clear wavy boundary.  
Bg1—22 to 31 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark gray (N 4/) dry; moderate

medium subangular blocky structure; common fine distinct light olive brown (2.5Y 5/6) redox concentrations; moderate medium subangular blocky structure; extremely hard, extremely firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; slightly acid; gradual wavy boundary.

Bg2—31 to 60 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6.2) dry; common fine distinct olive brown (2.5Y 4/4) redox concentrations; weak medium subangular blocky structure; very hard, firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 20 to 30 inches

*Depth to seasonal high water table:* 12 to 24 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Texture: Silty clay or silty clay loam

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bg horizons

Hue: 2.5Y, 5Y, or 5GY

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 0, 1, 2, or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

### Reedwest Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and escarpments

*Parent material:* Interbedded sandstone and shale residuum or semiconsolidated, loamy sedimentary beds

*Slope range:* 4 to 60 percent

*Elevation range:* 4,500 to 6,600 feet

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Reedwest loam, in an area of Cabba-Reedwest-Anceney complex, 15 to 45 percent slopes, in an area of rangeland, 300 feet south and 2,800 feet east of the northwest corner of sec. 32, T. 2 S., R. 4 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt1—5 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate coarse and medium subangular blocky structure; soft, friable, moderately sticky, and slightly plastic; many very fine and fine and common medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt2—9 to 21 inches; brown (10YR 4/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bk—21 to 26 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; strongly effervescent, slightly alkaline; gradual wavy boundary.

Cr—26 to 60 inches; weakly consolidated sandstone and siltstone.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees.

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 11 to 30 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
Reaction: pH 6.6 to 7.8

*Bt horizons*

Hue: 10YR or 2.5Y  
Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist  
Chroma: 2, 3, or 4  
Texture: Loam or clay loam  
Clay content: 18 to 35 percent  
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
Reaction: pH 6.6 to 7.8

*Bk horizon*

Hue: 10YR, 2.5Y, or 5Y  
Value: 6, 7, or 8 dry; 4, 5, or 6 moist  
Chroma: 2, 3, or 4  
Texture: Loam, clay loam, or fine sandy loam  
Clay content: 15 to 30 percent  
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.4 to 8.4

**447E—Reedwest-Adel-Castner complex,  
15 to 45 percent slopes**

**Setting**

*Landform:*

- Reedwest—Hills
- Adel—Hills
- Castner—Hills

*Slope:*

- Reedwest—15 to 35 percent
- Adel—15 to 45 percent
- Castner—15 to 45 percent

*Elevation:* 4,700 to 6,500 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

**Composition**

**Major Components**

Reedwest and similar soils: 40 percent

Adel and similar soils: 30 percent

Castner and similar soils: 15 percent

**Minor Components**

Soils less than 10 inches deep to bedrock: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 4 percent

Rock outcrop: 0 to 1 percent

**Major Component Description**

**Reedwest**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.3 inches

**Adel**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

**Castner**

*Surface layer texture:* Very channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**689F—Reedwest-Cabba complex,  
35 to 60 percent slopes**

**Setting**

*Landform:*

- Reedwest—Hills
- Cabba—Hills

*Slope:*

- Reedwest—35 to 60 percent
- Cabba—35 to 60 percent

*Elevation:* 4,500 to 6,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Reedwest and similar soils: 60 percent  
Cabba and similar soils: 30 percent

### Minor Components

Castner very stony loam: 0 to 8 percent  
Rock outcrop: 0 to 2 percent

## Major Component Description

### Reedwest

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.1 inches

### Cabba

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 947E—Reedwest-Cabba-Bowery complex, 15 to 45 percent slopes

## Setting

### Landform:

- Reedwest—Escarpments
- Cabba—Escarpments
- Bowery—Escarpments

### Slope:

- Reedwest—15 to 35 percent
- Cabba—15 to 45 percent
- Bowery—15 to 45 percent

*Elevation:* 4,550 to 6,050 feet

*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Reedwest and similar soils: 40 percent  
Cabba and similar soils: 35 percent  
Bowery and similar soils: 15 percent

### Minor Components

Anceney cobbly loam: 0 to 8 percent  
Rock outcrop: 0 to 2 percent

## Major Component Description

### Reedwest

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

### Cabba

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

### Bowery

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 11.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 347F—Reedwest-Cabba-Castner complex, 25 to 60 percent slopes

#### Setting

##### Landform:

- Reedwest—Hills
- Cabba—Hills
- Castner—Hills

##### Slope:

- Reedwest—25 to 60 percent
- Cabba—25 to 60 percent
- Castner—25 to 60 percent

*Elevation:* 5,450 to 6,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 95 to 110 days

#### Composition

##### Major Components

Reedwest and similar soils: 40 percent

Cabba and similar soils: 30 percent

Castner and similar soils: 20 percent

##### Minor Components

Bacbuster cobbly clay loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

#### Major Component Description

##### Reedwest

*Surface layer texture:* Cobbly clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.9 inches

##### Cabba

*Surface layer texture:* Cobbly clay loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

##### Castner

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### Rentsac Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and escarpments

*Parent material:* Gneiss or schist and argillite residuum

*Slope range:* 8 to 45 percent

*Elevation range:* 4,050 to 5,350 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Calciustepts

#### Typical Pedon

Rentsac channery sandy loam, in an area of Rentsac-Rock outcrop complex, 15 to 60 percent slopes, in an area of rangeland, 800 feet north and 2,600 feet west of the southeast corner of sec. 25, T. 3 N., R. 2 E.

A—0 to 4 inches; grayish brown (10YR 5/2) channery sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; loose, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent flagstones and 25 percent sandstone channers; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk—4 to 14 inches; pale brown (10YR 6/3) extremely channery sandy loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; 20 percent flagstones and 60 percent channers; few fine masses of lime; strongly effervescent; moderately alkaline; abrupt wavy boundary.

R—14 inches; hard platy sandstone.

#### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 8 inches and the lithic contact

*Depth to bedrock:* 10 to 20 inches

*A horizon*

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy loam or loam  
 Clay content: 7 to 18 percent  
 Content of rock fragments: 15 to 60 percent—0 to 20 percent cobbles or flagstones; 15 to 40 percent pebbles or channers  
 Reaction: pH 6.6 to 8.4

*Bk horizon*

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 6 or 7 dry; 4 or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or sandy loam  
 Clay content: 7 to 18 percent  
 Content of rock fragments: 35 to 80 percent—10 to 20 percent cobbles or flagstones; 25 to 60 percent pebbles or channers  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

### 412E—Rentsac-Amesha complex, 8 to 25 percent slopes

#### Setting

*Landform:*

- Rentsac—Escarpments
- Amesha—Escarpments

*Slope:*

- Rentsac—8 to 25 percent
- Amesha—8 to 15 percent

*Elevation:* 4,150 to 5,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Rentsac and similar soils: 50 percent

Amesha and similar soils: 40 percent

##### Minor Components

Musselshell very stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Rentsac

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

##### Amesha

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 712D—Rentsac-Rock outcrop complex, 8 to 15 percent slopes

#### Setting

*Landform:*

- Rentsac—Hills
- Rock outcrop—Hills

*Slope:* 8 to 15 percent

*Elevation:* 4,150 to 4,900 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Rentsac and similar soils: 65 percent

Rock outcrop: 20 percent

##### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Amesha loam: 0 to 5 percent

#### Major Component Description

##### Rentsac

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

##### Rock outcrop

*Definition:* Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 712E—Rentsac-Rock outcrop complex, 15 to 60 percent slopes

### Setting

#### Landform:

- Rentsac—Escarpments
- Rock outcrop—Escarpments

*Slope:* 15 to 45 percent

*Elevation:* 4,050 to 5,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Rentsac and similar soils: 65 percent

Rock outcrop: 20 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Amesha loam: 0 to 5 percent

### Major Component Description

#### Rentsac

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

#### Rock outcrop

*Definition:* Exposures of argillite, gneiss, or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Reycreek Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,050 to 4,350 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aridic Natrustolls

### Typical Pedon

Reycreek loam, in an area of Reycreek-Toston-Slickspots complex, 0 to 2 percent slopes, in an area of rangeland, 500 feet south and 1,700 feet west of the northeast corner of sec. 9, T. 1 S., R. 2 E.

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine and few medium roots; common fine and few medium pores; strongly effervescent; moderately alkaline; clear smooth boundary.

B<sub>tn</sub>—6 to 20 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; many very fine, common fine and few medium pores; common faint clay films on faces of ped and lining pores; strongly effervescent; very strongly alkaline; clear smooth boundary.

B<sub>kn</sub>—20 to 36 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; many very fine and few medium roots; common fine and few medium pores; common fine masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

B<sub>kg</sub>—36 to 60 inches; gray (10YR 6/1) silty clay loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; hard, firm, very sticky, and very plastic; few very fine roots; few very fine and medium pores; violently effervescent; common medium masses of lime; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 9 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the Bk horizon:* 15 to 30 inches

**A horizon**

Chroma: 1 or 2

Clay content: 20 to 27 percent

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 7.9 to 8.4

**Btn horizon**

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Silty clay loam or clay loam

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 8.5 to 9.6

**Bkn horizon**

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Silty clay loam, clay loam, silt loam, or loam

Clay content: 20 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 5 to 25

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 8.5 to 9.6

**Bkg horizon**

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1 or 2

Texture: Silty clay loam, clay loam, silt loam, loam, or sandy loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 8.5 to 9.0

**518A—Reycreek loam,  
0 to 2 percent slopes**

**Setting**

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,050 to 4,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Reycreek and similar soils: 90 percent

**Minor Components**

Threeriv loam: 0 to 5 percent

Greycliff loam: 0 to 3 percent

Slickspots: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**521A—Reycreek-Toston-Slickspots  
complex, 0 to 2 percent slopes**

**Setting**

*Landform:*

- Reycreek—Stream terraces
- Toston—Stream terraces

*Slope:*

- Reycreek—0 to 2 percent
- Toston—0 to 2 percent

*Elevation:* 4,050 to 4,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Reycreek and similar soils: 45 percent

Toston and similar soils: 30 percent

Slickspots: 10 percent

**Minor Components**

Greycliff loam: 0 to 5 percent

Rivra gravelly sandy loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

**Major Component Description**

**Reycreek**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.8 inches

### **Toston**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.5 inches

### **Slickspots**

*Definition:* A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

A typical description with range in characteristics is included, in alphabetical order, in this section.

## **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Rivra Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Very rapid  
*Landform:* Stream terraces and flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 6 percent  
*Elevation range:* 3,950 to 4,900 feet  
*Annual precipitation:* 10 to 14 inches  
*Annual air temperature:* 41 to 45 degrees F  
*Frost-free period:* 95 to 120 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Aridic Ustifluvents

### **Typical Pedon**

Rivra cobbly sandy loam, in an area of Fairway-Rivra complex, 0 to 2 percent slopes, in an area of rangeland, 1,200 feet south and 1,300 feet west of the northeast corner of sec. 9, T. 1 N., R. 1 E.

A—0 to 7 inches; dark gray (10YR 4/1) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; 15 percent cobbles and 20 percent pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

C—7 to 60 inches; brown (10YR 5/3) extremely gravelly coarse sand, light olive brown (2.5Y 5/4) moist; massive; loose, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 50 percent pebbles; moderately alkaline.

### **Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches

*Depth to seasonal high water table:* 0 to 6 feet for short durations during the months of April, May, June, and July.

#### *A horizon*

Hue: 10YR or 2.5Y

Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Clay loam, loam, or sandy loam

Clay content: 5 to 35 percent

Content of rock fragments: 0 to 40 percent—0 to 15 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

#### *C horizon*

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Sand, coarse sand, or loamy coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 55 to 80 percent—10 to 20 percent cobbles; 45 to 60 percent pebbles

Reaction: pH 7.4 to 8.4

## **201A—Rivra cobbly sandy loam, 2 to 6 percent slopes**

### **Setting**

*Landform:* Flood plains

*Slope:* 2 to 6 percent

*Elevation:* 4,250 to 4,750 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### **Composition**

#### **Major Components**

Rivra and similar soils: 85 percent

**Minor Components**

Glendive sandy loam: 0 to 5 percent  
 Rivra very cobbly sandy loam: 0 to 5 percent  
 Ryell sandy loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Available water capacity:* Mainly 2.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**401A—Rivra, moist-Ryell-Bonebasin, 0 to 2 percent slopes****Setting***Landform:*

- Rivra—Flood plains
- Ryell—Flood plains
- Bonebasin—Flood plains

*Slope:*

- Rivra—0 to 2 percent
- Ryell—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 4,000 to 4,600 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Rivra and similar soils: 50 percent  
 Ryell and similar soils: 30 percent  
 Bonebasin and similar soils: 10 percent

**Minor Components**

Blossberg loam: 0 to 5 percent  
 Meadowcreek loam: 0 to 5 percent

**Major Component Description****Rivra**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Forest land

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 2.7 inches

**Ryell**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.5 inches

**Bonebasin**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**801A—Rivra-Emyd-Greycliff complex, 0 to 2 percent slopes, protected****Setting***Landform:*

- Rivra—Flood plains
- Emyd—Flood plains
- Greycliff—Flood plains

*Slope:*

- Rivra—0 to 2 percent
- Emyd—0 to 2 percent
- Greycliff—0 to 2 percent

*Elevation:* 3,950 to 4,200 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 120 days

## Composition

### Major Components

Rivra and similar soils: 40 percent  
 Emyd and similar soils: 30 percent  
 Greycliff and similar soils: 20 percent

### Minor Components

Fairway loam: 0 to 5 percent  
 Threeriv loam: 0 to 3 percent  
 Slickspots: 0 to 2 percent

## Major Component Description

### Rivra

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.7 inches

### Emyd

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.0 inches

### Greycliff

*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:* None  
*Water table:* Apparent  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 701A—Rivra-Mccabe-Bonebasin complex, 0 to 2 percent slopes

### Setting

#### *Landform:*

- Rivra—Flood plains
- Mccabe—Flood plains
- Bonebasin—Flood plains

#### *Slope:*

- Rivra—0 to 2 percent
- Mccabe—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 3,950 to 4,400 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Rivra and similar soils: 45 percent  
 Mccabe and similar soils: 30 percent  
 Bonebasin and similar soils: 10 percent

### Minor Components

Rivra cobbly loam: 0 to 5 percent  
 Threeriv loam: 0 to 5 percent  
 Water: 0 to 3 percent  
 Riverwash: 0 to 2 percent

## Major Component Description

### Rivra

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forest land  
*Flooding:* Occasional  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.4 inches

### Mccabe

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forest land  
*Flooding:* Occasional  
*Water table:* Apparent  
*Available water capacity:* Mainly 4.5 inches

**Bonebasin**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Occasional  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**301A—Rivra-Ryell-Bonebasin complex,  
0 to 2 percent slopes****Setting***Landform:*

- Rivra—Flood plains
- Ryell—Flood plains
- Bonebasin—Flood plains

*Slope:*

- Rivra—0 to 2 percent
- Ryell—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 3,950 to 4,400 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Rivra and similar soils: 50 percent

Ryell and similar soils: 30 percent

Bonebasin and similar soils: 10 percent

**Minor Components**

Meadowcreek loam: 0 to 5 percent

Riverwash: 0 to 5 percent

**Major Component Description****Rivra**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.7 inches

**Ryell**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.5 inches

**Bonebasin**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Very poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Rochester Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Excessively drained  
*Permeability:* Rapid  
*Landform:* Hills  
*Parent material:* Gneiss or schist colluvium  
*Slope range:* 35 to 70 percent  
*Elevation range:* 4,900 to 6,600 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Typic Ustorthents

### Typical Pedon

Rochester very gravelly coarse sandy loam, in an area of Rochester, very stony-Rock outcrop complex, 35 to 70 percent slopes, in an area of forest land, 1,320 feet south and 800 feet east of the northwest corner of sec. 8, T. 4 S., R. 3 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; loose, very friable, nonsticky, and nonplastic; common very fine and fine and few medium roots; 15 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C1—4 to 11 inches; grayish brown (10YR 5/2) extremely cobbly loamy coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 25 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C2—11 to 27 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 35 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C3—27 to 60 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, and nonplastic; few fine, medium, and coarse roots; 5 percent stones, 35 percent cobbles, and 30 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 65 percent—1 to 5 percent stones; 15 to 20 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.3

#### C horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, or 3

Texture: Loamy coarse sand, loamy sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—5 to 10 percent stones; 15 to 35 percent cobbles; 15 to 40 percent pebbles

Reaction: pH 6.6 to 7.3

### 387G—Rochester, very stony-Rock outcrop complex, 35 to 70 percent slopes

#### Setting

##### Landform:

- Rochester—Hills
- Rock outcrop—Hills

*Slope:* 35 to 70 percent

*Elevation:* 4,900 to 6,600 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Rochester and similar soils: 80 percent

Rock outcrop: 10 percent

##### Minor Components

Catgulf and similar soils: 0 to 5 percent

Rochester bouldery sandy loam: 0 to 5 percent

#### Major Component Description

##### Rochester

*Surface layer texture:* Very gravelly coarse sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

##### Rock outcrop

*Definition:* Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### Rocko Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow  
*Landform:* Mountains  
*Parent material:* Sandstone colluvium  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,800 to 7,000 feet  
*Annual precipitation:* 20 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

### Typical Pedon

Rocko cobbly loam, 15 to 45 percent slopes, stony, in an area of forest land, 300 feet north and 2,500 feet east of the southwest corner of sec. 30, T. 5 N., R. 6 E.

Oi—0 to 1 inch; slightly decomposed needles and twigs.

A—1 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent stones, 15 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

E—6 to 16 inches; light brownish gray (10YR 6/2) stony loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent stones, 15 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

Bt—16 to 29 inches; brown (10YR 5/3) very cobbly clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; neutral; clear wavy boundary.

BC—29 to 60 inches; pale brown (10YR 6/3) very cobbly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches

### A horizon

Value: 3, 4, or 5 dry; 2 or 3 moist  
 Chroma: 1, 2, or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 15 to 35 percent—5 to 10 percent stones; 5 to 15 percent cobbles; 5 to 10 percent pebbles  
 Reaction: pH 6.1 to 7.3

### E horizon

Clay content: 18 to 27 percent  
 Content of rock fragments: 15 to 40 percent—5 to 10 percent stones; 5 to 15 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.1 to 7.3

### Bt horizon

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Clay loam or sandy clay loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 35 to 60 percent—5 to 10 percent stones; 15 to 25 percent cobbles; 15 to 30 percent pebbles  
 Reaction: pH 6.1 to 7.8

### BC horizon

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 3 or 4  
 Texture: Sandy loam, sandy clay loam, or loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 35 to 70 percent—5 to 10 percent stones; 15 to 30 percent cobbles; 15 to 30 percent pebbles  
 Reaction: pH 6.6 to 7.8

## 393E—Rocko cobbly loam, 15 to 45 percent slopes, stony

### Setting

*Landform:* Mountains  
*Slope:* 15 to 45 percent  
*Elevation:* 4,800 to 7,000 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Rocko and similar soils: 85 percent

#### Minor Components

Rubble land: 0 to 10 percent  
 Copenhagen channery loam: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 894F—Rocko, stony-Copenhaver, extremely stony complex, 35 to 60 percent slopes

#### Setting

*Landform:*

- Rocko—Mountains
- Copenhaver—Mountains

*Slope:*

- Rocko—35 to 60 percent
- Copenhaver—35 to 60 percent

*Elevation:* 4,950 to 6,900 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Rocko and similar soils: 70 percent

Copenhaver and similar soils: 20 percent

##### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Rocko

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.6 inches

#### Copenhaver

*Surface layer texture:* Extremely channery loam  
*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Sandstone residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Roy Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow  
*Landform:* Escarpments  
*Parent material:* Alluvium  
*Slope range:* 15 to 60 percent  
*Elevation range:* 4,700 to 6,000 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Roy cobbly clay loam, 15 to 60 percent slopes, in an area of rangeland, 1,500 feet north and 300 feet east of the southwest corner of sec. 20, T. 3 S., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 25 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt1—6 to 13 inches; brown (10YR 4/3) very cobbly clay, dark brown (10YR 3/3) moist; strong fine granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 20 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 18 inches; brown (10YR 4/3) very cobbly clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films

on faces of peds; 20 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

**Bt3**—18 to 24 inches; brown (10YR 5/3) very cobbly clay, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds; 25 percent cobbles and 25 percent pebbles; neutral; gradual wavy boundary.

**Bk**—24 to 60 inches; pale brown (10YR 6/3) extremely cobbly clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; few very fine roots; 35 percent cobbles and 35 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 14 inches

*Depth to the Bk horizon:* 20 to 40 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 15 to 35 percent—10 to 25 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt1 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt2 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt3 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Clay content: 27 to 40 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

## 267E—Roy cobbly clay loam, 15 to 60 percent slopes

### Setting

*Landform:* Escarpments

*Slope:* 15 to 60 percent

*Elevation:* 4,750 to 6,000 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Roy and similar soils: 90 percent

#### Minor Components

Roy very stony loam: 0 to 5 percent

Meagher cobbly loam: 0 to 3 percent

Bowyer loam: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 560—Rubble land-Rock outcrop complex

### Setting

#### Landform:

- Rubble land—Mountains
- Rock outcrop—Mountains

Elevation: 4,100 to 9,000 feet

### Composition

#### Major Components

Rubble land: 50 percent

Rock outcrop: 45 percent

#### Minor Components

Soils less than 20 inches deep: 0 to 5 percent

### Major Component Description

#### Rubble land

*Definition:* Areas with more than 90 percent of the surface covered by boulders or stones.

#### Rock outcrop

*Definition:* Areas of exposed bedrock.

### Ryell Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate above the 2C2 horizon and rapid in the 2C2 horizon

*Landform:* Stream terraces and flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,950 top 4,650 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Aridic Ustifluvents

### Typical Pedon

Ryell loam, in area of Ryell-Rivra-Fairway complex, 0 to 2 percent slopes, in an area of cropland, 500 feet north and 1,700 feet west of the southeast corner of sec. 26, T. 1 N., R. 1 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly

effervescent; moderately alkaline; abrupt wavy boundary.

AC—5 to 10 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—10 to 32 inches; light brownish gray (10YR 6/2) stratified very fine sandy loam and silt loam, with thin strata of fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—32 to 60 inches; variegated extremely gravelly loamy sand; loose, nonsticky, and nonplastic; 10 percent cobbles and 60 percent pebbles; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Depth to seasonal high water table:* 0 to 6 feet for short durations during late spring and summer

*Depth to the 2C2 horizon:* 18 to 36 inches

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam or fine sandy loam

Clay content: 10 to 25 percent

Reaction: pH 7.4 to 8.4

#### AC and C1 horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or very fine sandy loam with thin strata of silt loam and/or fine sandy loam

Clay content: 10 to 18 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

#### 2C2 horizon

Hue: 10YR, 2.5Y, or variegated

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

**4A—Ryell silt loam, 0 to 2 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Elevation:* 4,050 to 4,400 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Ryell and similar soils: 90 percent

**Minor Components**

Fairway loam: 0 to 5 percent  
 Glendive sandy 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**304A—Ryell-Rivra-Fairway complex, 0 to 2 percent slopes****Setting**

*Landform:*

- Ryell—Flood plains
- Rivra—Flood plains
- Fairway—Flood plains

*Slope:*

- Ryell—0 to 2 percent
- Rivra—0 to 2 percent
- Fairway—0 to 2 percent

*Elevation:* 3,950 to 4,650 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Ryell and similar soils: 35 percent  
 Rivra and similar soils: 30 percent  
 Fairway and similar soils: 25 percent

**Minor Components**

Bonebasin loam: 0 to 5 percent  
 Meadowcreek loam: 0 to 5 percent

**Major Component Description****Ryell**

*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:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 5.1 inches

**Rivra**

*Surface layer texture:* Gravelly sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Available water capacity:* Mainly 2.3 inches

**Fairway**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Available water capacity:* Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**SLF—Sanitary landfill****Composition****Major Components**

Sanitary landfill: 100 percent

### Major Component Description

*Definition:* Areas where refuse is processed and buried in the ground.

### Sappington Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Alluvial fans and relict stream terraces

*Parent material:* Alluvium

*Slope range:* 4 to 15 percent

*Elevation range:* 4,600 to 5,500 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 43 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Calcic Argiustolls

### Typical Pedon

Sappington loam, 4 to 8 percent slopes, in an area of cropland, 700 feet north and 2,300 feet east of the southwest corner of sec. 3, T. 2 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; neutral; clear smooth boundary.

Bt—4 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of ped; slightly alkaline; clear smooth boundary.

Bk1—7 to 14 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—14 to 24 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—24 to 60 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular

blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 7 to 9 inches

*Depth to the Bk horizon:* 6 to 10 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

#### Bk3 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.9 to 8.4

## 226D—Sappington cobbly loam, 4 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 15 percent  
*Elevation:* 4,700 to 5,500 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Sappington and similar soils: 85 percent

#### Minor Components

Amesha loam: 0 to 5 percent  
Soils with slopes more than 15 percent: 0 to 5 percent  
Trimad very cobbly loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 26C—Sappington loam, 4 to 8 percent slopes

### Setting

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 4,600 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Sappington and similar soils: 90 percent

#### Minor Components

Amesha loam: 0 to 5 percent  
Sappington cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Sawicki Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well  
*Permeability:* Moderately slow  
*Landform:* Alluvial fans, stream terraces, hills, and drainageways  
*Parent material:* Alluvium and colluvium derived from gneiss, schist, or arkosic sandstone  
*Slope range:* 0 to 60 percent  
*Elevation range:* 4,450 to 7,150 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Sawicki cobbly loam, 2 to 8 percent slopes, very stony, in an area of rangeland, 700 feet south and 2,800 feet west of the northeast corner of sec. 12, T. 1 N., R. 5 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, common fine and few medium pores; many very fine and few medium roots; 5 percent stones, 25 percent cobbles, and 10 percent pebbles; neutral; gradual wavy boundary.  
Bt1—5 to 12 inches; dark grayish brown (10YR 4/2) cobbly sandy clay loam, dark brown (10YR 3/3)

moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; few faint clay films on faces of peds and on pebbles; 5 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; gradual wavy boundary.

**Bt2**—12 to 23 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine roots; common very fine and fine and few medium pores; common distinct clay films on faces of peds and on pebbles; 5 percent stones, 25 percent cobbles, and 25 percent pebbles; slightly alkaline; gradual wavy boundary.

**BC**—23 to 31 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common very fine and fine and few medium pores; 5 percent stones, 25 percent cobbles, and 25 percent pebbles; slightly alkaline; gradual wavy boundary.

**C**—31 to 60 inches; dark yellowish brown (10YR 4/4) very cobbly coarse sandy loam, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; 5 percent stones, 25 percent cobbles, and 30 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

#### A horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 5 percent boulders; 0 to 5 percent stones; 10 to 25 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Sandy clay loam or loam

Clay content: 20 to 30 percent

Content of rock fragments: 15 to 50 percent—0 to 5 percent stones; 10 to 25 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt2 horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Loam or sandy clay loam

Clay content: 20 to 30 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 6.6 to 7.8

#### BC horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Coarse sandy loam, sandy loam, or sandy clay loam

Clay content: 15 to 25 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 6.6 to 7.8

#### C horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 70 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

### 261B—Sawicki cobbly loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,450 to 5,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Sawicki and similar soils: 85 percent

##### Minor Components

Breton loam: 0 to 5 percent

Clasoil loam: 0 to 5 percent

Sawicki very stony loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 361C—Sawicki cobbly loam, 2 to 8 percent slopes, very stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Elevation:* 4,500 to 5,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Sawicki and similar soils: 85 percent

#### Minor Components

Breton loam: 0 to 10 percent

Soils with slopes more than 8 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is 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—Sawicki cobbly loam, 4 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,600 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Sawicki and similar soils: 85 percent

#### Minor Components

Breton loam: 0 to 5 percent

Clasoil loam: 0 to 5 percent

Sawicki very stony loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 361D—Sawicki cobbly loam, 8 to 15 percent slopes, very stony

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,700 to 6,150 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Sawicki and similar soils: 85 percent

#### Minor Components

Breton loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 461D—Sawicki cobbly loam, 8 to 25 percent slopes, bouldery

#### Setting

*Landform:* Alluvial fans  
*Slope:* 8 to 25 percent  
*Elevation:* 5,000 to 6,050 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Sawicki and similar soils: 85 percent

##### Minor Components

Breton coarse sandy loam: 0 to 8 percent  
Clasoil cobbly sandy loam: 0 to 4 percent  
Soils with slopes more than 25 percent: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 661E—Sawicki cobbly loam, moist, 8 to 25 percent slopes, very stony

#### Setting

*Landform:* Drainageways  
*Slope:* 8 to 25 percent  
*Elevation:* 4,900 to 6,250 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

##### Major Components

Sawicki and similar soils: 90 percent

##### Minor Components

Breton loam: 0 to 5 percent  
Soils with slopes more than 25 percent: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 761E—Sawicki, stony-Catgulch, very stony complex, 15 to 35 percent slopes

#### Setting

*Landform:*

- Sawicki—Hills
- Catgulch—Hills

*Slope:*

- Sawicki—15 to 35 percent
- Catgulch—15 to 35 percent

*Elevation:* 5,500 to 7,150 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Sawicki and similar soils: 60 percent  
Catgulch and similar soils: 30 percent

##### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent  
Soils with slopes more than 35 percent: 0 to 3 percent  
Rock outcrop: 0 to 2 percent

### Major Component Description

#### Sawicki

*Surface layer texture:* Cobbly coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

#### Catgulch

*Surface layer texture:* Very cobbly coarse sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 761F—Sawicki-Catgulch complex, 35 to 60 percent slopes, very stony

#### Setting

##### Landform:

- Sawicki—Hills
- Catgulch—Hills

##### Slope:

- Sawicki—35 to 60 percent
- Catgulch—35 to 60 percent

*Elevation:* 4,850 to 6,950 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Sawicki and similar soils: 65 percent  
 Catgulch and similar soils: 20 percent

#### Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent  
 Breton coarse sandy loam: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Sawicki

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.7 inches

#### Catgulch

*Surface layer texture:* Very cobbly coarse sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Saypo Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,050 to 5,250 feet

*Annual precipitation:* 10 to 18 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 90 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aquic Calciustolls

### Typical Pedon

Saypo silt loam, 0 to 2 percent slopes, in an area of hayland, 200 feet north and 600 feet east of the southwest corner of sec. 9, T. 1 N., R. 4 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate

fine granular; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—10 to 21 inches; grayish brown (10YR 5/2) silt loam, gray (10YR 6/1) dry; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bkg1—21 to 34 inches; gray (10YR 6/1) silt loam, grayish brown (2.5Y 5/2) dry; few fine distinct yellowish brown (10YR 5/4) redox concentrations; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bkg2—34 to 60 inches; light brown (10YR 6/2) silt loam, white (10YR 8/1) dry; weak fine subangular blocky structure; very hard, very firm, moderately sticky, and slightly plastic; few very fine roots; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the Bk horizon:* 5 to 12 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 3, 4, or 5 dry

Chroma: 1 or 2

Clay content: 20 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 moist; 5, 6, or 7 dry

Chroma: 1, 2, or 3

Texture: Silt loam, clay loam, or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 20 to 40 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 8.4

#### Bkg horizons

Hue: 10YR, 5Y, or 2.5Y

Value: 4, 5, or 6 moist; 5, 6, 7, or 8 dry

Chroma: 1, 2, or 3

Texture: Silt loam, clay loam, silty clay loam, or loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 20 to 40 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.9 to 8.4

### 506A—Saypo silt loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,050 to 5,100 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Saypo and similar soils: 85 percent

##### Minor Components

Newtman mucky peat: 0 to 5 percent

Reycreek loam: 0 to 5 percent

Tetonview 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:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 517A—Saypo silt loam, 0 to 2 percent slopes, drained

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,200 to 4,600 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Saypo and similar soils: 85 percent

#### Minor Components

Saypo silty clay loam: 0 to 10 percent

Binna loam: 0 to 5 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:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 515A—Saypo-Tetonview complex, 0 to 2 percent slopes, hummocky

### Setting

*Landform:*

- Saypo—Stream terraces
- Tetonview—Stream terraces

*Slope:*

- Saypo—0 to 2 percent
- Tetonview—0 to 2 percent

*Elevation:* 4,150 to 5,250 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Saypo and similar soils: 65 percent

Tetonview and similar soils: 25 percent

#### Minor Components

Newtman mucky peat: 0 to 5 percent

Reycreek loam: 0 to 5 percent

### Major Component Description

#### Saypo

*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:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 7.4 inches

#### Tetonview

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Scravo Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid above the sandy-skeletal material and rapid below

*Landform:* Escarpments

*Parent material:* Alluvium or colluvium

*Slope range:* 15 to 45 percent

*Elevation range:* 3,950 to 5,400 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Aridic Calciustepts

### Typical Pedon

Scravo cobbly sandy loam, in an area of Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes, in an area of rangeland, 500 feet south and 2,400 feet west of the northeast corner of sec. 13, T. 1 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) cobbly sandy loam, dark grayish brown (10YR 4/2) moist;

weak, fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 15 percent cobbles and 20 percent pebbles; slightly effervescent, slightly alkaline; clear smooth boundary.

Bk—4 to 13 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; common very fine and few fine and medium roots; 5 percent cobbles and 40 percent pebbles; common medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

2Bk—13 to 60 inches; variegated stratified sand and very gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 10 percent cobbles and 50 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches

*Depth to the Bk horizon:* 3 to 6 inches

*Depth to the 2Bk horizon:* 9 to 20 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 5, 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 35 percent—10 to 15 percent cobbles; 5 to 20 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 7.8

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 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: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 2

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

#### 2Bk horizon

Hue: 10YR, 2.5Y, or variegated

Value: 6, 7, or 8 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: 35 to 80 percent—0 to

15 percent cobbles; 35 to 65 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 2

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.9 to 8.4

### Shadow Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat excessively drained

*Permeability:* Moderately rapid

*Landform:* Mountains

*Parent material:* Gneiss or schist colluvium

*Slope range:* 15 to 75 percent

*Elevation range:* 5,000 to 7,800 feet

*Annual precipitation:* 20 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Eutrocrypts

### Typical Pedon

Shadow very cobbly coarse sandy loam, moist, 35 to 60 percent slopes, stony, in an area of forest land, 300 feet north and 2,650 feet west of the southeast corner of sec. 7, T. 3 S., R. 6 E.

Oi—0 to 3 inches; slightly decomposed bark, needles, and twigs.

E—3 to 17 inches; brown (10YR 5/3) very cobbly coarse sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine, common fine and few medium roots; 20 percent cobbles and 30 percent pebbles; moderately acid; clear smooth boundary.

Bw—17 to 33 inches; light brownish gray (10YR 6/3) very gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and few fine and medium roots; 20 percent cobbles and 35 percent pebbles; slightly acid; clear smooth boundary.

C1—33 to 44 inches; pale brown (10YR 6/3) extremely gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky, and nonplastic; few very fine, fine, and medium roots; 20 percent cobbles and 50 percent pebbles, slightly acid; clear smooth boundary.

C2—44 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sandy loam with thin strata of loamy coarse sand, dark brown (10YR 4/3) moist; massive; loose, very friable, nonsticky,

and nonplastic; few very fine roots; 35 percent cobbles and 45 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 8 and 24 inches

#### *E horizon*

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Coarse sandy loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 5.1 to 7.3

#### *Bw horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sandy loam or coarse sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent cobbles; 35 to 70 percent pebbles

Reaction: pH 5.1 to 7.8

#### *C horizons*

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 5 to 15 percent

Content of rock fragments: 60 to 85 percent—0 to 35 percent cobbles; 40 to 50 percent pebbles

Reaction: pH 5.1 to 7.8

### **395F—Shadow very cobbly coarse sandy loam, 35 to 60 percent slopes, stony**

#### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 5,200 to 6,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Shadow and similar soils: 90 percent

##### Minor Components

Cowood channery sandy loam: 0 to 5 percent

Jaegie and similar soils: 0 to 4 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Very cobbly coarse 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:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### **295F—Shadow very cobbly coarse sandy loam, moist, 35 to 60 percent slopes, stony**

#### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 5,350 to 7,350 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Shadow and similar soils: 90 percent

##### Minor Components

Jaegie coarse sandy loam: 0 to 4 percent

Cowood channery sandy loam: 0 to 3 percent

Soils with slopes more than 60 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Very cobbly coarse 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:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 995G—Shadow, bouldery-Rubble land complex, 40 to 70 percent slopes

#### Setting

*Landform:*

- Shadow—Mountains
- Rubble land—Mountains

*Slope:* 40 to 70 percent

*Elevation:* 6,100 to 7,300 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Shadow and similar soils: 60 percent

Rubble land: 25 percent

##### Minor Components

Arcette and similar soils: 0 to 10 percent

Rock outcrop: 0 to 5 percent

#### Major Component Description

##### Shadow

*Surface layer texture:* Very cobbly 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:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

##### Rubble land

*Definition:* Areas with more than 90 percent of surface covered by boulders or stones.

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 495F—Shadow, stony-Cowood, very stony complex, 35 to 60 percent slopes

#### Setting

*Landform:*

- Shadow—Mountains
- Cowood—Mountains

*Slope:*

- Shadow—35 to 60 percent
- Cowood—35 to 60 percent

*Elevation:* 5,650 to 7,800 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Shadow and similar soils: 70 percent

Cowood and similar soils: 20 percent

##### Minor Components

Jaegie and similar soils: 0 to 8 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Shadow

*Surface layer texture:* Very cobbly 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:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

##### Cowood

*Surface layer texture:* Channery sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 495G—Shadow, stony-Cowood, very stony complex, 60 to 75 percent slopes

#### Setting

*Landform:*

- Shadow—Mountains
- Cowood—Mountains

*Slope:*

- Shadow—60 to 75 percent
- Cowood—60 to 75 percent

*Elevation:* 5,000 to 6,800 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Shadow and similar soils: 70 percent

Cowood and similar soils: 20 percent

**Minor Components**

Jaegie and similar soils: 0 to 8 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Shadow***Surface layer texture:* Very cobbly 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:* Forest land*Flooding:* None*Available water capacity:* Mainly 3.7 inches**Cowood***Surface layer texture:* Channery sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Shawmut Series***Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Alluvial fans, hills, escarpments, and relict stream terraces*Parent material:* Alluvium or colluvium*Slope range:* 8 to 45 percent*Elevation range:* 4,500 to 6,500 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

**Typical Pedon**

Shawmut cobbly loam, in an area of Meagher-Shawmut-Bowery complex, 15 to 45 percent slopes, in an area of rangeland, 1,200 feet south and 2,900 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

A—0 to 6 inches; dark brown (10YR 3/3) cobbly loam, very dark brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 20 percent cobbles and 10 percent pebbles; slightly alkaline; clear smooth boundary.

Bt—6 to 14 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and few fine roots; common distinct clay films on faces of peds and lining pores; 15 percent cobbles and 25 percent pebbles; slightly alkaline; clear smooth boundary.

Btk—14 to 19 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common distinct clay films on faces of peds and lining pores; 20 percent cobbles and 40 percent pebbles; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—19 to 28 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 20 percent cobbles and 45 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—28 to 60 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 20

percent cobbles and 45 percent pebbles; many fine threads of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 16 inches

*Depth to the calcic horizon:* 9 to 20 inches

#### A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 15 to 50 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 7.5YR or 10YR

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent stones; 10 to 20 percent cobbles; 25 to 45 percent pebbles

Reaction: pH 6.6 to 7.8

#### Btk horizon

Hue: 7.5YR or 10YR

Value: 3, 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam, sandy clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 30 to 50 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy clay loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 40 to 80 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

#### Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy clay loam, or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 40 to 80 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.9 to 8.4

## 355D—Shawmut cobbly loam, 8 to 15 percent slopes, stony

### Setting

*Landform:* Alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 5,000 to 5,250 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Shawmut and similar soils: 90 percent

#### Minor Components

Shawmut very stony loam: 0 to 5 percent

Meagher stony loam: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 639E—Shawmut-Tolbert complex, 15 to 45 percent slopes, very stony

### Setting

#### Landform:

- Shawmut—Hills
- Tolbert—Hills

#### Slope:

- Shawmut—15 to 45 percent
- Tolbert—15 to 45 percent

*Elevation:* 4,500 to 6,500 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Shawmut and similar soils: 70 percent

Tolbert and similar soils: 20 percent

#### Minor Components

Soils with slopes more than 45 percent: 0 to 5 percent

Shawmut bouldery loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Shawmut

*Surface layer texture:* Very cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

#### Tolbert

*Surface layer texture:* Cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Shurley Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Rapid

*Landform:* Hills

*Parent material:* Gneiss or schist colluvium

*Slope range:* 8 to 35 percent

*Elevation range:* 4,300 to 5,250 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Sandy-skeletal, mixed, frigid Aridic Haplustepts

### Typical Pedon

Shurley very flaggy coarse sandy loam, in an area of Shurley-Rentsac-Rock outcrop complex, 8 to 35 percent slopes, in an area of rangeland, 2,300 feet east of the northwest corner of sec. 20, T. 1 S., R. 1 E.

A—0 to 4 inches; grayish brown (10YR 5/2) very flaggy coarse sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; 15 percent flagstones and 20 percent channers; neutral; clear smooth boundary.

Bw—4 to 11 inches; yellowish brown (10YR 5/4) very flaggy coarse sandy loam, brown (10YR 4/3) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine and few medium roots; 25 percent flagstones and 30 percent channers; slightly alkaline; clear smooth boundary.

Bk—11 to 23 inches; light gray (10YR 7/2) extremely flaggy loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, very friable, nonsticky, and nonplastic; common very fine and few fine and medium roots; 35 percent flagstones and 35 percent channers; common faint lime coatings on undersides of coarse fragments; strongly effervescent; slightly alkaline; gradual irregular boundary.

BC—23 to 60 inches; light gray (10YR 7/2) extremely flaggy loamy coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose, very friable, nonsticky, and nonplastic; few very fine and fine roots; 35 percent flagstones and 35 percent channers; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches

*Depth to the Bk horizon:* 10 to 24 inches

#### A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 6.6 to 8.4

#### Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 5 to 15 percent

Content of rock fragments: 40 to 60 percent—20 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 6.6 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loamy coarse sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—20 to 40 percent cobbles or flagstones; 20 to 45 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### BC horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loamy coarse sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—20 to 40 percent cobbles or flagstones; 20 to 45 percent pebbles or channers

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

### 729E—Shurley-Rentsac-Rock outcrop complex, 8 to 35 percent slopes

#### Setting

##### Landform:

- Shurley—Hills
- Rentsac—Hills
- Rock outcrop—Hills

##### Slope:

- Shurley—8 to 35 percent
- Rentsac—8 to 35 percent

*Elevation:* 4,300 to 5,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Shurley and similar soils: 40 percent

Rentsac and similar soils: 30 percent

Rock outcrop: 20 percent

##### Minor Components

Kalsted sandy loam: 0 to 5 percent

Nuley sandy loam: 0 to 5 percent

#### Major Component Description

##### Shurley

*Surface layer texture:* Very flaggy coarse sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.5 inches

##### Rentsac

*Surface layer texture:* Very flaggy sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

##### Rock outcrop

*Definition:* Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Sicklesteets Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains

*Parent material:* Dolomite colluvium

*Slope range:* 15 to 60 percent

*Elevation range:* 5,150 to 7,700 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Ustic Haplocryalfs

### Typical Pedon

Sicklesteets cobbly clay loam, in an area of Whitore-Sicklesteets complex, 15 to 40 percent slopes, stony, in an area of forest land, 2,000 feet south and 1,800 feet east of the northwest corner of sec. 3, T. 3 S., R. 6 E.

Oi—0 to 2 inches; intermediately decomposed needles and twigs.

E—2 to 6 inches; brown (10YR 5/3) cobbly clay loam, dark brown (10YR 4/3) moist; moderate fine and medium granular structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine, common fine and few medium roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt—6 to 18 inches; pale olive (5Y 6/3) clay, brown (10YR 5/3) moist; strong medium granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Btk—18 to 21 inches; pale olive (5Y 6/3) clay, light olive brown (2.5Y 5/4) moist; strong fine subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium and few coarse roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—21 to 44 inches; mixed pale olive and pale yellow (5Y 6/3 and 7/3) clay loam, olive yellow and olive (5Y 5/2 and 5/4) moist; weak fine subangular blocky structure; very hard, firm, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

2Ck—44 to 60 inches; mixed reddish yellow and pale yellow (5YR 6/6 and 5Y 7/3) extremely gravelly clay loam, yellowish red and olive (5YR 4/6 and 5Y 5/4); massive, very hard, firm, moderately sticky, and moderately plastic; few very fine roots; 25 percent cobbles and 40 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 15 to 27 inches

#### E horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 15 to 25 percent—1 to 3 percent stones; 5 to 10 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 40 to 60 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.3

*Btk horizon*

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 5 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

*Bk horizon*

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 27 to 40 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 5 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

*2Ck horizon*

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Clay loam or clay

Clay content: 27 to 40 percent

Content of rock fragments: 45 to 70 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 30 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

**Soapcreek Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Permeability:* Slow

*Landform:* Flood plains and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,200 to 6,000 feet

*Annual precipitation:* 12 to 18 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine, mixed, superactive, frigid  
Fluvaquentic Haplustolls

**Typical Pedon**

Soapcreek silty clay loam, 0 to 2 percent slopes, in an area of hayland, 250 feet north and 300 feet east of the southwest corner of sec. 35, T. 1 N., R. 5 E.

Ap—0 to 15 inches; very dark brown (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; slightly alkaline; clear wavy boundary.

Bk1—15 to 25 inches; grayish brown (10YR 5/2), silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common fine seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—25 to 37 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; few fine distinct dark yellowish brown (10YR 4/4) moist redox concentrations; few very fine and fine roots; common fine seams and masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—37 to 46 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common fine distinct dark yellowish brown (10YR 4/6) moist redox concentrations; few very fine roots; disseminated lime, few fine masses of lime; violently effervescent;; moderately alkaline; clear wavy boundary.

Bg1—46 to 54 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2); weak fine subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common fine distinct dark yellowish brown (10YR 4/4) moist redox concentrations; few very fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

Bg2—54 to 60 inches; grayish brown (10YR 5/2) stratified loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, moderately

sticky, and moderately plastic; few very fine roots; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches

*Depth to seasonal high water table:* 24 to 42 inches

#### *Ap horizon*

Value: 2 or 3 moist; 3, 4, or 5 dry

Chroma: 1 or 2

Texture: Silty clay or silty clay loam

Clay content: 30 to 50 percent

Reaction: pH 7.4 to 8.4

#### *Bk horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 3 or 4 moist; 4, 5, or 6 dry

Chroma: 1 or 2

Texture: Silty clay or silty clay loam

Clay content: 35 to 50 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

#### *Bg horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 or 5 moist; 5 or 6 dry

Chroma: 1 or 2

Texture: Silty clay loam, silty clay, or either with thin layers of fine sandy loam

Clay content: 25 to 45 percent

Reaction: pH 7.4 to 8.4

### 514A—Soapcreek silty clay loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,200 to 6,000 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Soapcreek and similar soils: 85 percent

##### Minor Components

Meadowcreek silty clay loam: 0 to 10 percent

Blossberg loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 9.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 507A—Soapcreek-Bonebasin complex, 0 to 2 percent slopes

#### Setting

*Landform:*

- Soapcreek—Flood plains
- Bonebasin—Flood plains

*Slope:*

- Soapcreek—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 5,300 to 5,900 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Soapcreek and similar soils: 60 percent

Bonebasin and similar soils: 30 percent

##### Minor Components

Meadowcreek silty clay loam: 0 to 5 percent

Reycreek loam: 0 to 3 percent

Blossberg loam: 0 to 2 percent

### Major Component Description

#### Soapcreek

*Surface layer texture:* Silty clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 9.6 inches

### **Bonebasin**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Sourdough Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 4,950 to 5,750 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiustolls

### **Typical Pedon**

Sourdough loam, 0 to 4 percent slopes, in an area of hayland, 200 feet south and 500 feet west of the northeast corner of sec. 10, T. 3 S., R. 5 E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

AB—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; many

very fine and common fine and medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—12 to 15 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; many very fine, common fine, and few medium roots; common faint clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—15 to 26 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt3—26 to 36 inches; brown (10YR 5/3) cobbly silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; common faint clay films on faces of peds and lining pores; 10 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

2C—36 to 60 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, dark brown (10YR 3/3) moist; massive; loose, nonsticky, and nonplastic; common very fine and few fine roots; 5 percent stones, 35 percent cobbles, and 30 percent pebbles; common distinct lime coatings on undersides of coarse fragments; slightly alkaline.

### **Range in Characteristics**

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches and includes all or part of the argillic horizon

*Depth to the 2C horizon:* 20 to 40 inches

#### *A horizon*

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

#### *AB horizon*

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam, silt loam, or loam  
 Clay content: 18 to 30 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

**Bt1 and Bt2 horizons**

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Silty clay loam or clay loam  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.3

**Bt3 horizon**

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Silty clay loam, clay loam, or silt loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 10 to 30 percent—5 to 15 percent cobbles; 5 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.3

**2C horizon**

Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Loamy coarse sand or coarse sand  
 Clay content: 0 to 10 percent  
 Content of rock fragments: 40 to 80 percent—5 to 10 percent stones; 20 to 40 percent cobbles; 20 to 50 percent pebbles  
 Reaction: pH 6.6 to 7.8

### **357B—Sourdough loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,950 to 5,750 feet  
*Mean annual precipitation:* 18 to 22 inches  
*Frost-free period:* 80 to 95 days

#### **Composition**

##### **Major Components**

Sourdough and similar soils: 90 percent

##### **Minor Components**

Hyalite loam: 0 to 5 percent  
 Beaverton cobbly loam: 0 to 3 percent  
 Turner loam, moderately wet: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Spanpeak Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Hills  
*Parent material:* Gneiss or schist colluvium  
*Slope range:* 25 to 60 percent  
*Elevation range:* 5,000 to 7,200 feet  
*Annual precipitation:* 17 to 24 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Argicryolls

#### **Typical Pedon**

Spanpeak coarse sandy loam, in an area of Spanpeak-Bavdark coarse sandy loams, 25 to 50 percent slopes, in an area of forest land, 200 feet south and 600 feet west of the northeast corner of sec. 1, T. 4 S., R. 3 E.

Oi—0 to 2 inches; forest litter of slightly decomposed leaves, needles, and twigs.

A—2 to 16 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark gray (10YR 3/1) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and common fine pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

BA—16 to 25 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, and

nonplastic; common medium and few very fine, fine, and coarse roots; many very fine and common fine and medium pores; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

**Bt**—25 to 33 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common medium and few coarse roots; common very fine and fine and few medium pores; few faint clay films on faces of peds and pebble surfaces; 20 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

**C**—33 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few coarse roots; common very fine, fine, and medium pores; 15 percent cobbles and 30 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 10 to 15 inches

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 12 to 18 percent

Content of rock fragments: 5 to 25 percent—0 to 3 percent stones; 0 to 10 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### BA horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 12 to 20 percent

Content of rock fragments: 10 to 25 percent—5 to 10 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

#### C horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Coarse sandy loam or loamy coarse sand

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

## 278F—Spanpeak coarse sandy loam, 35 to 60 percent slopes

### Setting

*Landform:* Hills

*Slope:* 35 to 60 percent

*Elevation:* 5,200 to 6,850 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Spanpeak and similar soils: 85 percent

#### Minor Components

Shadow stony coarse sandy loam: 0 to 8 percent

Cowood very stony sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Coarse sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Gneiss or schist colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 778F—Spanpeak-Bavdark coarse sandy loams, 25 to 50 percent slopes

### Setting

*Landform:*

- Spanpeak—Hills

- Bavdark—Hills

*Slope:*

- Spanpeak—25 to 50 percent

- Bavdark—25 to 50 percent

*Elevation:* 5,000 to 7,200 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Spanpeak and similar soils: 60 percent  
 Bavdark and similar soils: 30 percent

#### Minor Components

Cowood very stony sandy loam: 0 to 5 percent  
 Shadow and similar soils: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Spanpeak

*Surface layer texture:* Coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Gneiss or schist colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.1 inches

#### Bavdark

*Surface layer texture:* Coarse sandy loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Stemple Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Alpine till or sandstone colluvium  
*Slope range:* 15 to 60 percent  
*Elevation range:* 5,350 to 8,200 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive  
 Typic Palecryalfs

### Typical Pedon

Stemple cobbly sandy loam, 35 to 60 percent slopes, stony, in an area of forest land, 2,300 feet north and 2,400 feet east of the southwest corner of sec. 22, T. 6 S., R. 3 E.

Oi—0 to 2 inches; forest litter.

E1—2 to 9 inches; light gray (10YR 7/2) cobbly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure breaking to moderate medium granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium and coarse roots; 5 percent stones, 15 percent cobbles, and 15 percent pebbles; moderately acid; clear wavy boundary.

E2—9 to 25 inches; light gray (10YR 7/2) very cobbly sandy loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent stones, 30 percent cobbles, and 15 percent pebbles; slightly acid; clear wavy boundary.

E/Bt—25 to 32 inches; E part: light gray (10YR 7/2) very gravelly coarse sandy loam, brown (10YR 5/3) moist; Bt part: yellowish brown (10YR 5/4) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and moderately plastic; few very fine, fine, and medium roots; 15 percent cobbles and 30 percent pebbles; slightly acid; clear smooth boundary.

Bt—32 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds; 10 percent cobbles and 30 percent pebbles; neutral.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bt horizon:* 25 to 50 inches

#### E1 horizon

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 6 or 7 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 10 to 20 percent

Content of rock fragments: 20 to 50 percent—2 to 5 percent stones; 5 to 15 percent cobbles; 15 to 45 percent pebbles

Reaction: pH 5.1 to 6.5

*E2 horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 80 percent—0 to 10 percent stones; 5 to 25 percent cobbles; 15 to 60 percent pebbles

Reaction: pH 5.1 to 6.5

*E/Bt horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: E part 6, 7, or 8 dry; 4, 5, or 6 moist; Bt part 5 or 6 dry; 4 or 5 moist

Chroma: E part 2, 3, or 4; B part 4, 5, or 6

Texture: Loam, coarse sandy loam, sandy loam, or sandy clay loam

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 80 percent—5 to 30 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 5.1 to 6.5

*Bt horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 4, 5, or 6

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 5.6 to 7.3

**293E—Stemple cobbly sandy loam,  
15 to 35 percent slopes, stony**

**Setting**

*Landform:* Mountains

*Slope:* 15 to 35 percent

*Elevation:* 5,600 to 8,000 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Stemple and similar soils: 85 percent

**Minor Components**

Stemple bouldery sandy loam: 0 to 10 percent

Soils with slopes more than 35 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alpine till or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**293F—Stemple cobbly sandy loam,  
35 to 60 percent slopes, stony**

**Setting**

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 5,800 to 8,200 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Stemple and similar soils: 85 percent

**Minor Components**

Stemple bouldery sandy loam: 0 to 10 percent

Soils with slopes more than 60 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly sandy loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alpine till or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## 493F—Stemple very cobbly loam, 25 to 60 percent slopes, stony

### Setting

*Landform:* Mountains

*Slope:* 25 to 60 percent

*Elevation:* 5,350 to 6,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Stemple and similar soils: 85 percent

#### Minor Components

Stemple bouldery loam: 0 to 7 percent

Cowood very stony loam: 0 to 5 percent

Rubble land: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Very cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Storyhill Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Relict stream terraces and hills

*Parent material:* Alluvium and colluvium

*Slope range:* 4 to 45 percent

*Elevation range:* 4,750 to 6,100 feet

*Annual precipitation:* 18 to 22 inches

*Annual air temperature:* 37 to 41 degrees F

*Frost-free period:* 80 to 95 days

**Taxonomic Class:** Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

### Typical Pedon

Storyhill cobbly loam, in an area of Bigbear-Storyhill-Adel complex, 15 to 45 percent slopes, in an area of rangeland, 600 feet north and 400 feet east of the southwest corner of sec. 33, T. 1 S., R. 6 E.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; moderate fine subangular blocky structure parting to strong medium granular; soft, friable, moderately sticky, and very plastic; many very fine roots, common fine, and medium roots, few coarse roots; 10 percent cobbles and 10 percent pebbles; slightly acid; clear smooth boundary.

Bt1—10 to 21 inches; yellowish brown (10YR 5/4) very cobbly clay, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; slightly hard, very firm, very sticky, and very plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 20 percent cobbles and 20 percent pebbles; neutral; gradual wavy boundary.

Bt2—21 to 32 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very firm, moderately sticky, and very plastic; common very fine and few fine roots; common distinct clay films on faces of peds and lining pores; 20 percent cobbles and 25 percent pebbles; slightly alkaline; clear wavy boundary.

Bk—32 to 60 inches; pale brown (10YR 6/3) very cobbly sandy clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; common fine threads of lime, common lime coatings on coarse fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 39 to 43 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 15 inches

*Depth to the Bk horizon:* 20 to 40 inches

#### A horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 45 percent—0 to 10 percent stones; 10 to 20 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

**Bt horizons**

Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 3 or 4  
 Texture: Clay or clay loam  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 15 to 30 percent pebbles  
 Reaction: pH 6.1 to 7.8

**Bk horizon**

Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Clay loam or sandy clay loam  
 Clay content: 30 to 40 percent  
 Content of rock fragments: 40 to 70 percent—0 to 5 percent stones; 20 to 40 percent cobbles; 20 to 30 percent pebbles  
 Calcium carbonate equivalent: 15 to 30 percent  
 Reaction: pH 7.4 to 8.4

**365E—Storyhill, very stony-  
 Bigbear, stony-Adel complex,  
 15 to 45 percent slopes**

**Setting****Landform:**

- Storyhill—Hills
- Bigbear—Hills
- Adel—Hills

**Slope:**

- Storyhill—15 to 45 percent
- Bigbear—15 to 45 percent
- Adel—15 to 45 percent

**Elevation:** 5,100 to 6,050 feet

**Mean annual precipitation:** 18 to 22 inches

**Frost-free period:** 65 to 95 days

**Composition****Major Components**

Storyhill and similar soils: 40 percent

Bigbear and similar soils: 25 percent

Adel and similar soils: 20 percent

**Minor Components**

Alder clay loam: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

**Major Component Description****Storyhill**

**Surface layer texture:** Very cobbly 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 5.6 inches

**Bigbear**

**Surface layer texture:** Cobbly loam

**Depth class:** Very deep (more than 60 inches)

**Drainage class:** Well drained

**Dominant parent material:** Alluvium or colluvium

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 7.5 inches

**Adel**

**Surface layer texture:** Loam

**Depth class:** Very deep (more than 60 inches)

**Drainage class:** Well drained

**Dominant parent material:** Alluvium or colluvium

**Native plant cover type:** Rangeland

**Flooding:** None

**Available water capacity:** Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**665D—Storyhill-Bigbear complex,  
 4 to 15 percent slopes**

**Setting****Landform:**

- Storyhill—Hills
- Bigbear—Hills

**Slope:**

- Storyhill—4 to 15 percent
- Bigbear—4 to 15 percent

**Elevation:** 4,750 to 6,000 feet

**Mean annual precipitation:** 18 to 22 inches

**Frost-free period:** 80 to 95 days

**Composition****Major Components**

Storyhill and similar soils: 50 percent

Bigbear and similar soils: 35 percent

**Minor Components**

Bowery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Storyhill very stony loam: 0 to 5 percent

## Major Component Description

### Storyhill

*Surface layer texture:* Cobbly 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 6.1 inches

### Bigbear

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Straw Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 4 percent  
*Elevation range:* 4,350 to 6,150 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls

### Typical Pedon

Straw loam, 0 to 4 percent slopes, in an area of cropland, 1,300 feet south and 1,200 feet west of the northeast corner of sec. 2, T. 1 N., R. 5 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly alkaline; abrupt smooth boundary.

A2—6 to 18 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly alkaline; clear wavy boundary.

Bk1—18 to 30 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; few fine threads of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 38 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; disseminated lime, few fine threads of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

BC1—38 to 50 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine roots; slightly alkaline; gradual wavy boundary.

BC2—50 to 60 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, moderately sticky, and moderately plastic; few very fine roots; slightly alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 45 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 16 to 28 inches  
*Depth to the Bk horizon:* 16 to 30 inches

### A horizons

Hue: 10YR or 2.5Y  
 Value: 3 or 4 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Texture: Loam or silty clay loam  
 Clay content: 20 to 35 percent  
 Reaction: pH 6.6 to 7.8

### Bk horizons

Hue: 10YR or 2.5Y  
 Value: 4, 5, or 6 dry; 3, 4, or 5 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam, silt loam, or clay loam  
 Clay content: 20 to 35 percent  
 Calcium carbonate equivalent: 3 to 15 percent  
 Reaction: pH 7.4 to 8.4

### BC horizons

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4  
 Texture: Loam, silt loam, or clay loam  
 Clay content: 20 to 35 percent  
 Reaction: pH 6.6 to 8.4

### 64B—Straw loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,350 to 6,150 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Straw and similar soils: 90 percent

##### Minor Components

Enbar loam: 0 to 5 percent  
 Sudworth loam: 0 to 3 percent  
 Straw clay loam: 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 364B—Straw silty clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,400 to 5,100 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Straw and similar soils: 85 percent

##### Minor Components

Enbar clay loam: 0 to 10 percent  
 Sudworth silty clay 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### Sudworth Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate above the 2Ck horizon and rapid below  
*Landform:* Stream terraces and flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 2 percent  
*Elevation range:* 4,300 to 5,800 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy over sandy or sandy skeletal, mixed, superactive, frigid Cumulic Haplustolls

#### Typical Pedon

Sudworth loam, in an area of Sudworth-Nesda loams, 0 to 2 percent slopes, in an area of hayland, 2,500 feet north and 2,120 feet west of the southeast corner of sec. 14, T. 2 S., R. 4 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; many very fine and common fine roots; slightly alkaline; clear smooth boundary.  
 A2—7 to 18 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; very hard,

friable, slightly sticky, and slightly plastic; common very fine roots; slightly alkaline; clear smooth boundary.

A3—18 to 24 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; very hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; slightly alkaline; abrupt wavy boundary.

Bk—24 to 29 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

2Ck—29 to 35 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 15 percent cobbles and 35 percent pebbles; common distinct lime casts on coarse fragments; slightly effervescent; moderately alkaline; clear smooth boundary.

2C—35 to 60 inches; variegated extremely gravelly sand; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 20 percent cobbles and 50 percent pebbles; mildly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 16 to 36 inches

*Depth to seasonal high water table:* 4 to 8 feet

*Depth to the 2C horizon:* 20 to 40 inches

#### A horizons

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

#### 2C horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 2 to 7 percent

Content of rock fragments: 35 to 80 percent—0 to 30 percent stones and cobbles; 35 to 50 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

### 307A—Sudworth silty clay loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,400 to 4,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Sudworth and similar soils: 85 percent

##### Minor Components

Enbar loam: 0 to 5 percent

Nesda loam: 0 to 5 percent

Turner 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 6.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 407A—Sudworth-Nesda loams, 0 to 2 percent slopes

### Setting

#### Landform:

- Sudworth—Flood plains
- Nesda—Flood plains

#### Slope:

- Sudworth—0 to 2 percent
- Nesda—0 to 2 percent

*Elevation:* 4,300 to 5,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Sudworth and similar soils: 60 percent

Nesda and similar soils: 25 percent

#### Minor Components

Meadowcreek loam: 0 to 8 percent

Enbar loam: 0 to 5 percent

Bonebasin loam: 0 to 2 percent

### Major Component Description

#### Sudworth

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.9 inches

#### Nesda

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Tamaneen Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Relict stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Elevation range:* 5,300 to 5,900 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine, smectitic, frigid Typic Argiustolls

### Typical Pedon

Tamaneen cobbly clay loam, 0 to 4 percent slopes, in an area of rangeland, 1,200 feet north and 200 feet east of the southwest corner of sec. 28, T. 2 N., R. 10 E. in Park County, Montana.

A—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—4 to 8 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine, fine, and medium roots; few faint clay films on faces of ped; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—8 to 12 inches; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of ped; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt3—12 to 17 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; strong fine angular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of ped; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—17 to 22 inches; light brownish gray (2.5Y 6/2) gravelly clay loam, dark grayish brown (2.5Y 4/2)

moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles and 15 percent pebbles; common distinct lime coatings on coarse fragments; strongly effervescent, moderately alkaline; clear smooth boundary.

2Ck1—22 to 30 inches; light brownish gray (2.5Y 6/2) very cobbly loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; common distinct lime coatings on coarse fragments; violently effervescent; moderately alkaline; abrupt smooth boundary.

2Ck2—30 to 60 inches; light gray (2.5Y 7/2) extremely cobbly sandy loam, grayish brown (2.5Y 5/3) moist; massive; soft, very friable, nonsticky, and nonplastic; 40 percent cobbles and 30 percent pebbles; common distinct lime coatings on coarse fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 8 to 16 inches

*Depth to the calcic horizon:* 12 to 24 inches

*Depth to the 2C horizon:* 17 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 25 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or silty clay

Clay content: 30 to 45 percent

Content of rock fragments: 5 to 20 percent—0 to 5 percent cobbles; 5 to 15 percent pebbles

Calcium carbonate equivalent: 20 to 30 percent

Reaction: pH 7.4 to 8.4

#### 2Ck horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Clay loam, sandy clay loam, loam, or sandy loam

Clay content: 8 to 30 percent

Content of rock fragments: 35 to 80 percent—15 to 40 percent cobbles; 20 to 40 percent pebbles

Calcium carbonate equivalent: 25 to 40 percent

Reaction: pH 7.9 to 8.4

### 158B—Tamaneen clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 5,300 to 5,550 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Tamaneen and similar soils: 90 percent

##### Minor Components

Shawmut very cobbly loam: 0 to 5 percent

Tamaneen cobbly loam: 0 to 3 percent

Work clay loam: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 358B—Tamaneen cobbly clay loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 5,300 to 5,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Tamaneen and similar soils: 90 percent

##### Minor Components

Shawmut cobbly clay loam: 0 to 5 percent

Tamaneen very cobbly clay loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Tanna Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Sedimentary plains, hills, and escarpments

*Parent material:* Semiconsolidated, clayey sedimentary beds

*Slope range:* 4 to 35 percent

*Elevation range:* 4,100 to 5,050 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine, smectitic, frigid Aridic Argiustolls

### Typical Pedon

Tanna clay loam, 4 to 8 percent slopes, in an area of cropland, 1,300 feet north and 400 feet east of the southwest corner of sec. 25, T. 1 N., R. 1 E.

Ap—0 to 3 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and common medium roots; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt1—3 to 7 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bt2—7 to 12 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; very hard, very firm, very sticky, and very plastic; common very fine and few fine and medium roots; many distinct clay films on faces of peds and lining pores; 5 percent pebbles; moderately alkaline; clear wavy boundary.

Bk—12 to 28 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; 10 percent paralithic chips in lower part; few medium masses of lime; strongly effervescent; strongly alkaline; clear wavy boundary.

Cr1—28 to 35 inches; light gray (2.5Y 7/2) semiconsolidated, clayey sedimentary beds that crush to silty clay loam, gray (2.5Y 6/2) moist; few gypsum crystals, few fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr2—35 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, clayey sedimentary beds that crush to silty clay loam, gray (2.5Y 6/2) moist; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 12 inches  
*Depth to paralithic contact:* 20 to 40 inches  
*Depth to the Bk horizon:* 11 to 18 inches

**A horizon**

Hue: 10YR or 2.5Y  
 Value: 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 27 to 35 percent  
 Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.8

**Bt horizons**

Hue: 10YR or 2.5Y  
 Value: 4, 5, or 6 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Texture: Clay loam, clay, or silty clay  
 Clay content: 35 to 45 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.6 to 8.4

**Bk horizon**

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Clay loam or silty clay loam  
 Clay content: 30 to 40 percent  
 Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 9.0

### **40C—Tanna clay loam, 4 to 8 percent slopes**

**Setting**

*Landform:* Sedimentary plains  
*Slope:* 4 to 8 percent  
*Elevation:* 4,350 to 4,600 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Tanna and similar soils: 85 percent

**Minor Components**

Cabbart loam: 0 to 5 percent  
 Patouza clay: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **740D—Tanna-Udecide complex, 8 to 15 percent slopes**

**Setting***Landform:*

- Tanna—Hills
- Udecide—Hills

*Slope:*

- Tanna—8 to 15 percent
- Udecide—8 to 15 percent

*Elevation:* 4,350 to 5,050 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Tanna and similar soils: 45 percent  
 Udecide and similar soils: 40 percent

**Minor Components**

Cabbart loam: 0 to 8 percent  
 Headwaters loam: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

**Major Component Description****Tanna**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

**Udecide**

*Surface layer texture:* Sandy clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**740E—Tanna-Udecide complex,  
15 to 35 percent slopes****Setting***Landform:*

- Tanna—Escarpments
- Udecide—Escarpments

*Slope:*

- Tanna—15 to 35 percent
- Udecide—15 to 35 percent

*Elevation:* 4,100 to 4,900 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Tanna and similar soils: 45 percent

Udecide and similar soils: 40 percent

**Minor Components**

Cabbart loam: 0 to 8 percent

Kalsted sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Tanna**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, clayey sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.7 inches

**Udecide**

*Surface layer texture:* Cobbly sandy clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tetonview Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,100 to 5,250 feet

*Annual precipitation:* 12 to 18 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 90 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

**Typical Pedon**

Tetonview silt loam, 0 to 2 percent slopes, in an area of rangeland, 2,700 feet north and 2,500 feet east of the southwest corner of sec. 24, T. 1 N., R. 4 E.

Oi—0 to 2 inches; slightly decomposed fibers and roots of sedges and rushes.

A—2 to 10 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak fine platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—10 to 23 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; disseminated lime, few

fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bkg**—23 to 36 inches; light gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) moist; few fine faint (10YR 5/4) redox concentrations; weak fine subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; disseminated lime, few fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

**Cg**—36 to 60 inches; gray (N 5/) silty clay loam, dark grayish brown (10YR 4/2) moist; many fine faint (10YR 5/4) redox concentrations; massive; very hard, firm, moderately sticky, and moderately plastic; 5 percent pebbles; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 23 inches

*Depth to seasonal high water table:* 12 to 24 inches

*Depth to the Bk horizon:* 7 to 13 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

#### Cg horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1 or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

### 538A—Tetonview silt loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,150 to 4,450 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Tetonview and similar soils: 85 percent

##### Minor Components

Lamoose silt loam: 0 to 5 percent

Newtman mucky peat: 0 to 5 percent

Saypo silt loam: 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:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 539A—Tetonview silt loam, 0 to 2 percent slopes, drained

#### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,100 to 4,400 feet

*Mean annual precipitation:* 12 to 16 inches

*Frost-free period:* 95 to 115 days

## Composition

### Major Components

Tetonview and similar soils: 85 percent

### Minor Components

Newtman mucky peat: 0 to 10 percent

Saypo silt loam: 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:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 540A—Tetonview-Newtman complex, 0 to 2 percent slopes

### Setting

*Landform:*

- Tetonview—Stream terraces
- Newtman—Stream terraces

*Slope:*

- Tetonview—0 to 2 percent
- Newtman—0 to 2 percent

*Elevation:* 4,100 to 5,150 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Tetonview and similar soils: 50 percent

Newtman and similar soils: 40 percent

#### Minor Components

Saypo silt loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

### Major Component Description

#### Tetonview

*Surface layer texture:* Silt loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.1 inches

#### Newtman

*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:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Threeriv Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Permeability:* Moderately slow

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 4,000 to 6,100 feet

*Annual precipitation:* 10 to 18 inches

*Annual air temperature:* 39 to 41 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid  
Typic Fluvaquents

### Typical Pedon

Threeriv loam, in an area of Threeriv-Bonebasin loams, 0 to 2 percent slopes, rare flooding, in an area of pasture, 2,200 feet south and 200 feet west of the northeast corner of sec. 2, T. 1 N., R. 1 E.

Oe—0 to 4 inches; partially decomposed sedges, rushes, and grasses; slightly alkaline; clear smooth boundary.

Ag—4 to 9 inches; dark gray (10YR 4/1) loam, gray (10YR 5/1) dry; few fine prominent brown (7.5YR

4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common medium roots and few very fine and fine roots; 10 percent pebbles; strongly effervescent; moderately alkaline.

**Cg**—9 to 29 inches; light brownish gray (10YR 6/2) sandy clay loam consisting of strata of sandy clay loam and sandy loam; light gray (10YR 7/2) dry; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; hard, friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 10 percent pebbles; violently effervescent; moderately alkaline; clear smooth boundary.

**2C**—29 to 60 inches; variegated extremely gravelly loamy sand, single grain; loose, nonsticky, and nonplastic; 15 percent cobbles and 60 percent pebbles; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to seasonal high water table:* Ponded to 12 inches

*Depth to the 2C horizon:* 20 to 40 inches

#### Ag horizon

Hue: 10YR, N, or 5Y

Value: 3 or 4 moist; 5 or 6 dry

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

#### Cg horizon

Hue: 10YR, 5Y, or 2.5Y

Value: 4, 5, or 6 moist; 5, 6 or 7 dry

Chroma: 1 or 2

Texture: Stratified sandy clay loam, sandy loam, silty clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

#### 2C horizon

Hue: 10YR or variegated

Value: 4 or 5 moist; 5 or 6 dry

Texture: Loamy sand, loamy coarse sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 85 percent—10 to 25 percent cobbles; 25 to 60 percent pebbles

Reaction: pH 7.9 to 8.4

## 556A—Threeriv-Bonebasin loams, 0 to 2 percent slopes

### Setting

#### Landform:

- Threeriv—Flood plains
- Bonebasin—Flood plains

#### Slope:

- Threeriv—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 4,000 to 6,100 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Threeriv and similar soils: 45 percent

Bonebasin and similar soils: 45 percent

#### Minor Components

Blossberg loam: 0 to 5 percent

Strongly saline soils: 0 to 5 percent

### Major Component Description

#### Threeriv

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.3 inches

#### Bonebasin

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### 559A—Threeriv-Bonebasin loams, 0 to 2 percent slopes, irrigation induced wetness

### Setting

#### Landform:

- Threeriv—Stream terraces
- Bonebasin—Stream terraces

#### Slope:

- Threeriv—0 to 2 percent
- Bonebasin—0 to 2 percent

*Elevation:* 4,100 to 4,650 feet

*Mean annual precipitation:* 12 to 18 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Threeriv and similar soils: 45 percent

Bonebasin and similar soils: 45 percent

#### Minor Components

Blossberg loam: 0 to 5 percent

Fairway loam: 0 to 5 percent

### Major Component Description

#### Threeriv

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.3 inches

#### Bonebasin

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### 561A—Threeriv-Greycliff complex, 0 to 2 percent slopes

### Setting

#### Landform:

- Threeriv—Stream terraces
- Greycliff—Stream terraces

#### Slope:

- Threeriv—0 to 2 percent
- Greycliff—0 to 2 percent

*Elevation:* 4,000 to 4,300 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Threeriv and similar soils: 65 percent

Greycliff and similar soils: 20 percent

#### Minor Components

Bigsandy silty clay loam: 0 to 10 percent

Reycreek loam: 0 to 5 percent

### Major Component Description

#### Threeriv

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Available water capacity:* Mainly 5.4 inches

#### Greycliff

*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:* None

*Water table:* Apparent

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### *Tiban Series*

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains and hills

*Parent material:* Sandstone, dolomite, or argillite colluvium

*Slope range:* 4 to 70 percent

*Elevation range:* 4,300 to 7,300 feet

*Annual precipitation:* 17 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustic Haplocryolls

### Typical Pedon

Tiban channery loam, in an area of Tiban-Castner channery loams, 45 to 70 percent slopes, in an area of forest land, 1,600 feet north and 1,300 feet east of the southwest corner of sec. 11, T. 3 N., R. 3 E.

Oi—0 to 4 inches; moderately decomposed needles and twigs.

A—4 to 16 inches; very dark grayish brown (10YR 3/2) channery loam; black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 15 percent channers; neutral; gradual wavy boundary.

Bw1—16 to 19 inches; dark grayish brown (10YR 4/2) channery loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine and common medium roots; 30 percent channers; neutral; clear wavy boundary.

Bw2—19 to 29 inches; yellowish brown (10YR 5/4) very channery loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium and few coarse roots; 5 percent flagstones and 45 percent channers; neutral; abrupt smooth boundary.

Bk1—29 to 44 inches; very pale brown (10YR 7/3) very channery loam, pale brown (10YR 6/3) moist;

moderate fine and very fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common medium and few fine and coarse roots; 10 percent flagstones and 45 percent channers; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—44 to 60 inches; pale brown (10YR 6/3) extremely channery loam, brown (10YR 5/3) moist; massive; loose, nonsticky, and nonplastic; few medium and coarse roots; 15 percent flagstones and 50 percent channers; common fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 15 to 30 inches

#### *A horizon*

Hue: 10YR to 2.5YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 25 percent—0 to 5 percent stones; 5 to 20 percent channers or pebbles

Reaction: pH 6.1 to 7.3

#### *Bw horizons*

Hue: 10YR to 2.5YR

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 25 to 55 percent—0 to 10 percent stones; 0 to 5 percent cobbles or flagstones; 25 to 50 percent channers or pebbles

Reaction: pH 6.6 to 7.3

#### *Bk horizons*

Hue: 10YR to 2.5YR

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 50 to 80 percent—0 to 10 percent stones; 10 to 20 percent flagstones or cobbles; 40 to 60 percent channers or pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

**680F—Tiban cobbly loam,  
35 to 60 percent slopes, stony**

**Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 5,000 to 7,300 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Tiban and similar soils: 85 percent

**Minor Components**

Soils 40 inches or less deep to bedrock: 0 to 8 percent  
 Accola loam: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Dolomite colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**678E—Tiban, stony-Bridger complex,  
4 to 25 percent slopes**

**Setting**

*Landform:*  
 • Tiban—Hills  
 • Bridger—Drainageways  
*Slope:*  
 • Tiban—4 to 25 percent  
 • Bridger—4 to 25 percent  
*Elevation:* 5,600 to 6,450 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Tiban and similar soils: 50 percent  
 Bridger and similar soils: 35 percent

**Minor Components**

Tiban very stony loam: 0 to 8 percent  
 Copenhaver and similar soils: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

**Major Component Description**

**Tiban**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Sandstone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

**Bridger**

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**461G—Tiban-Adel complex,  
40 to 70 percent slopes**

**Setting**

*Landform:*  
 • Tiban—Hills  
 • Adel—Hills  
*Slope:*  
 • Tiban—40 to 70 percent  
 • Adel—40 to 60 percent  
*Elevation:* 4,600 to 5,850 feet  
*Mean annual precipitation:* 20 to 24 inches  
*Frost-free period:* 50 to 70 days

**Composition**

**Major Components**

Tiban and similar soils: 60 percent  
 Adel and similar soils: 30 percent

**Minor Components**

Copenhaver flaggy loam: 0 to 8 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Tiban

*Surface layer texture:* Channery loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Argillite colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.5 inches

#### Adel

*Surface layer texture:* Loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 478E—Tiban-Castner channery loams, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Tiban—Hills, north aspects
- Castner—Hills, south aspects

##### *Slope:*

- Tiban—15 to 45 percent
- Castner—15 to 45 percent

*Elevation:* 4,600 to 6,750 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Tiban and similar soils: 70 percent  
 Castner and similar soils: 20 percent

#### Minor Components

Timberlin stony loam: 0 to 5 percent  
 Soils with slopes more than 45 percent: 0 to 3 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Tiban

*Surface layer texture:* Channery loam  
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.5 inches

#### Castner

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 478G—Tiban-Castner channery loams, 45 to 70 percent slopes

#### Setting

##### *Landform:*

- Tiban—Hills, north aspects
- Castner—Hills, south aspects

##### *Slope:*

- Tiban—45 to 70 percent
- Castner—45 to 70 percent

*Elevation:* 4,300 to 6,700 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Tiban and similar soils: 55 percent  
 Castner and similar soils: 30 percent

#### Minor Components

Timberlin flaggy loam: 0 to 8 percent  
 Soils with slopes less than 45 percent: 0 to 5 percent  
 Rock outcrop: 0 to 2 percent

### Major Component Description

#### Tiban

*Surface layer texture:* Channery loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.5 inches

### **Castner**

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Timberlin Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Mountains and hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 15 to 60 percent

*Elevation range:* 4,800 to 7,900 feet

*Annual precipitation:* 17 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

### **Typical Pedon**

Timberlin very flaggy loam, in an area of Bangtail-Timberlin, stony complex, moist, 15 to 45 percent slopes, in an area of forest land, 1,400 feet south and 300 feet east of the northwest corner of sec. 11, T. 1 N., R. 7 E.

Oi—0 to 1 inch; slightly decomposed leaves, needles, and twigs.

A—1 to 6 inches; grayish brown (10YR 5/2) flaggy loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; 20 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bt1—6 to 11 inches; brown (10YR 5/3) very flaggy clay loam, brown (10YR 4/3) moist; moderate fine

subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bt2—11 to 25 inches; brown (10YR 5/3) very flaggy clay loam; brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, and very plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 15 percent channers; slightly acid; clear wavy boundary.

Cr—25 to 30 inches; pale brown (10YR 6/3) semiconsolidated shale that textures to clay loam; slightly acid.

R—30 inches; olive (5Y 5/3) hard sandstone.

### **Range in Characteristics**

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the R horizon:* 20 to 40 inches

*Note:* The A horizon does not meet the thickness requirements for a mollic epipedon.

#### *A horizon*

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 3 percent stones; 0 to 20 percent flagstones or angular cobbles; 5 to 15 percent channers or angular pebbles

Reaction: pH 6.6 to 7.3

*Note:* Some pedons contain an E horizon below the A horizon.

#### *Bt1 horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy clay loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—20 to 35 percent flagstones or angular cobbles; 15 to 25 percent channers or angular pebbles

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 loam or clay loam

Clay content: 25 to 35 percent  
 Content of rock fragments: 35 to 70 percent—20  
 to 40 percent flagstones or angular cobbles; 15  
 to 30 percent channers or angular pebbles  
 Reaction: pH 6.1 to 7.3

### 694F—Timberlin-Copenhaver complex, 35 to 60 percent slopes

#### Setting

##### *Landform:*

- Timberlin—Mountains
- Copenhaver—Mountains

##### *Slope:*

- Timberlin—35 to 60 percent
- Copenhaver—35 to 60 percent

*Elevation:* 5,000 to 7,900 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Timberlin and similar soils: 65 percent

Copenhaver and similar soils: 25 percent

##### Minor Components

Bangtail loam, moist: 0 to 7 percent

Rock outcrop: 0 to 3 percent

#### Major Component Description

##### Timberlin

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.3 inches

##### Copenhaver

*Surface layer texture:* Flaggy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### Tolbert Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Hills and sedimentary plains

*Parent material:* Interbedded sandstone and shale residuum, igneous residuum, sandstone residuum, or argillite residuum

*Slope range:* 2 to 70 percent

*Elevation range:* 4,250 to 7,100 feet

*Annual precipitation:* 10 to 22 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 80 to 115 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Argiustolls

#### Typical Pedon

Tolbert cobbly loam, in an area of Tolbert, stony-Rock outcrop complex, 8 to 15 percent slopes, in an area of rangeland, 200 feet north and 3,300 feet east of the southwest corner of sec. 8, T. 1 S., R. 1 E.

A—0 to 4 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent angular cobbles and 15 percent angular pebbles; neutral; clear wavy boundary.

Bt1—4 to 10 inches; brown (10YR 4/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; few faint clay films on faces of peds and rock fragments; 35 percent angular cobbles and 25 percent angular pebbles; slightly alkaline; gradual wavy boundary.

Bt2—10 to 16 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine roots; few faint clay films on faces of peds and rock fragments; 5 percent stones, 35 percent angular cobbles, and 20 percent angular pebbles; slightly alkaline; clear wavy boundary.

R—16 inches; hard, fractured volcanic rock.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Mollic epipedon thickness:* 7 to 16 inches  
*Depth to bedrock:* 10 to 20 inches

#### A horizon

Hue: 10YR or 2.5Y  
 Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 27 percent  
 Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 5 to 45 percent pebbles  
 Reaction: pH 6.6 to 7.4

#### Bt horizons

Hue: 10YR or 2.5Y  
 Value: 4 or 5 dry; 3 or 4 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam, sandy clay loam, or clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 35 to 75 percent—0 to 5 percent stones; 20 to 40 percent cobbles; 15 to 30 percent pebbles  
 Reaction: pH 6.6 to 7.8

### 339E—Tolbert cobbly loam, 8 to 35 percent slopes, very stony

#### Setting

*Landform:* Hills  
*Slope:* 8 to 35 percent  
*Elevation:* 5,000 to 6,100 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Tolbert and similar soils: 90 percent

##### Minor Components

Reedwest loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 4 percent  
 Rock outcrop: 0 to 1 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 739E—Tolbert, stony-Rock outcrop complex, 15 to 60 percent slopes

#### Setting

*Landform:*

- Tolbert—Hills
- Rock outcrop—Hills

*Slope:* 15 to 60 percent

*Elevation:* 4,500 to 6,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Tolbert and similar soils: 65 percent  
 Rock outcrop: 20 percent

##### Minor Components

Anceney stony loam: 0 to 5 percent  
 Blaincreek channery loam: 0 to 5 percent  
 Soils less than 10 inches deep to bedrock: 0 to 5 percent

#### Major Component Description

##### Tolbert

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Argillite residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.8 inches

##### Rock outcrop

*Definition:* Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**739D—Tolbert, stony-Rock outcrop complex, 8 to 15 percent slopes****Setting***Landform:*

- Tolbert—Hills
- Rock outcrop—Hills

*Slope:* 8 to 15 percent*Elevation:* 4,800 to 5,900 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 65 percent

Rock outcrop: 20 percent

**Minor Components**

Blaincreek channery loam: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

**Major Component Description****Tolbert***Surface layer texture:* Cobbly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches**Rock outcrop***Definition:* Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**239E—Tolbert, stony-Rock outcrop complex, 8 to 45 percent slopes****Setting***Landform:* Hills*Slope:* 8 to 45 percent*Elevation:* 4,250 to 5,300 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Tolbert and similar soils: 65 percent

Rock outcrop: 20 percent

**Minor Components**

Anceney cobbly loam: 0 to 5 percent

Blaincreek loam: 0 to 5 percent

Reedpoint less than 10 inches deep to bedrock: 0 to 5 percent

**Major Component Description****Tolbert***Surface layer texture:* Cobbly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Igneous residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches**Rock outcrop***Definition:* Exposures of extrusive igneous rock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**870D—Tolbert-Absarook-Rock outcrop complex, 4 to 15 percent slopes****Setting***Landform:*

- Tolbert—Hills
- Absarook—Hills
- Rock outcrop—Hills

*Slope:*

- Tolbert—4 to 15 percent
- Absarook—4 to 15 percent

*Elevation:* 5,500 to 6,500 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 50 percent

Absarook and similar soils: 30 percent

Rock outcrop: 10 percent

**Minor Components**

Farnuf loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

**Major Component Description****Tolbert**

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

**Absarook**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**870E—Tolbert-Absarook-Rock outcrop complex, 15 to 35 percent slopes****Setting**

*Landform:*

- Tolbert—Hills
- Absarook—Hills
- Rock outcrop—Hills

*Slope:*

- Tolbert—15 to 35 percent
- Absarook—15 to 35 percent

*Elevation:* 4,400 to 6,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Tolbert and similar soils: 45 percent

Absarook and similar soils: 30 percent

Rock outcrop: 15 percent

**Minor Components**

Farnuf loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

**Major Component Description****Tolbert**

*Surface layer texture:* Channery loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

**Absarook**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.3 inches

**Rock outcrop**

*Definition:* Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**439D—Tolbert-Blaincreek complex, 2 to 15 percent slopes****Setting**

*Landform:*

- Tolbert—Hills
- Blaincreek—Hills

*Slope:*

- Tolbert—2 to 15 percent
- Blaincreek—2 to 15 percent

*Elevation:* 5,450 to 6,600 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 55 percent

Blaincreek and similar soils: 30 percent

**Minor Components**

Shawmut gravelly loam: 0 to 8 percent

Bowery loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches**Blaincreek***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**439E—Tolbert-Blaincreek-Adel complex,  
15 to 45 percent slopes****Setting***Landform:*

- Tolbert—Hills
- Blaincreek—Hills
- Adel—Hills

*Slope:*

- Tolbert—15 to 45 percent
- Blaincreek—15 to 45 percent
- Adel—15 to 45 percent

*Elevation:* 4,400 to 6,500 feet*Mean annual precipitation:* 17 to 22 inches*Frost-free period:* 65 to 100 days**Composition****Major Components**

Tolbert and similar soils: 35 percent

Blaincreek and similar soils: 30 percent

Adel and similar soils: 20 percent

**Minor Components**

Tolex and similar soils: 0 to 8 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

**Major Component Description****Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches**Blaincreek***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.5 inches**Adel***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tolex Series**

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills

*Parent material:* Argillite residuum

*Slope range:* 15 to 70 percent

*Elevation range:* 4,200 to 6,700 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustalfs

**Typical Pedon**

Tolex very channery coarse sandy loam, 45 to 70 percent slopes, in an area of rangeland, 2,000 feet south and 300 feet east of the northwest corner of sec. 31, T. 4 N., R. 4 E.

E—0 to 4 inches; brown (10YR 5/3) very channery coarse sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium roots; 5 percent flagstones and 40 percent channers; neutral; clear smooth boundary.

Bt—4 to 15 inches; light yellowish brown (10YR 6/4) extremely channery clay loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, moderately sticky, and moderately plastic; few faint clay films on faces of peds and coarse fragments; few very fine and medium roots; 15 percent flagstones and 55 percent channers; slightly alkaline; clear wavy boundary.

R—15 inches; hard platy argillite.

**Range in Characteristics**

*Soil temperature:* 44 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to bedrock:* 10 to 20 inches

**E horizon**

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles or flagstones; 30 to 50 percent pebbles or channers

Reaction: pH 6.6 to 7.3

**Bt horizon**

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam, sandy clay loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 50 to 75 percent—10 to 15 percent cobbles or flagstones; 40 to 60 percent pebbles or channers

Reaction: pH 6.6 to 7.8

**812E—Tolex very channery coarse sandy loam, 15 to 45 percent slopes****Setting**

*Landform:* Hills

*Slope:* 15 to 45 percent

*Elevation:* 4,750 to 6,400 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition****Major Components**

Tolex and similar soils: 85 percent

**Minor Components**

Soils more than 20 inches deep to bedrock: 0 to 10 percent

Rock outcrop: 0 to 5 percent

**Major Component Description**

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**812G—Tolex very channery coarse sandy loam, 45 to 70 percent slopes****Setting**

*Landform:* Hills

*Slope:* 45 to 70 percent

*Elevation:* 4,200 to 6,350 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

## Composition

### Major Components

Tolex and similar soils: 90 percent

### Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

## Major Component Description

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 912E—Tolex very channery coarse sandy loam, moist, 15 to 45 percent slopes

### Setting

*Landform:* Hills

*Slope:* 15 to 45 percent

*Elevation:* 4,700 to 6,450 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Tolex and similar soils: 90 percent

#### Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

## Major Component Description

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 912G—Tolex very channery coarse sandy loam, moist, 45 to 70 percent slopes

### Setting

*Landform:* Hills

*Slope:* 45 to 70 percent

*Elevation:* 4,400 to 6,700 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Tolex and similar soils: 90 percent

#### Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

## Major Component Description

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Toston Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Permeability:* Slow

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Elevation range:* 3,950 to 4,350 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 43 to 45 degrees F

*Frost-free period:* 95 to 120 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aridic Natrustalfs

### Typical Pedon

Toston loam, 0 to 2 percent slopes, in an area of rangeland, 800 feet south and 700 feet east of the northwest corner of sec. 7, T. 3 N., R. 3 E.

A—0 to 3 inches; gray (10YR 3/2) loam, very dark grayish brown (10YR 6/1) dry; weak medium platy structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bt<sub>ny</sub>—3 to 8 inches; dark gray (10YR 3/1) silty clay, very dark gray (10YR 5/1) dry; moderate coarse prismatic structure parting to strong fine angular blocky; very hard, very friable, very sticky, and very plastic; many very fine and few medium roots; common distinct clay films on faces of peds; few fine masses of gypsum; strongly alkaline; clear smooth boundary.

Bk<sub>nyz</sub>1—8 to 20 inches; light brownish gray (10YR 4/2) silty clay loam, dark grayish brown (10YR 6/2) dry; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; many very fine and few medium roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk<sub>nyz</sub>2—20 to 24 inches; light brownish gray (10YR 4/2) silty clay loam, dark grayish brown (10YR 6/2) dry; few fine and medium faint dark yellowish brown (10YR 3/4) redox concentrations; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk<sub>nyz</sub>3—24 to 32 inches; gray (10YR 3/1) silty clay loam, very dark gray (10YR 5/1) dry; few fine and medium distinct dark yellowish brown (10YR 4/4) redox concentrations; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk<sub>nyz</sub>4—32 to 40 inches; light brownish gray (2.5Y 4/2) silty clay loam, dark grayish brown (2.5Y 6/2) dry; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak fine subangular blocky structure; very hard, very firm, very sticky, and very plastic; few very fine roots; few fine masses of gypsum and other salts; many fine

masses of lime; violently effervescent; very strongly alkaline; clear smooth boundary.

C<sub>n</sub>—40 to 60 inches; light brownish gray (2.5Y 4/2) sandy clay loam with strata of clay loam and loamy sand, dark grayish brown (2.5Y 6/2) dry; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; hard, firm, moderately sticky, and moderately plastic; violently effervescent; very strongly alkaline.

### Range in Characteristics

*Soil temperature:* 45 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to seasonal high water table:* 24 to 42 inches

*Depth to the B<sub>kn</sub> horizon:* 6 to 20 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 20 to 27 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 0 to 8

Reaction: pH 7.9 to 9.0

*Note:* Cultivated areas have an Ap horizon of silty clay loam or silty clay.

#### B<sub>t<sub>ny</sub></sub> horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 45 percent

Electrical conductivity (mmhos/cm): 4 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 8.5 to 9.6

#### B<sub>k<sub>nyz</sub></sub> horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 8 to 16

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 8.5 to 9.5

#### C<sub>n</sub> horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Stratified clay loam to loamy sand

Clay content: 10 to 30 percent

Electrical conductivity (mmhos/cm): 8 to 16

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 9.6

**502A—Toston loam, 0 to 2 percent slopes****Setting**

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 3,950 to 4,250 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 120 days

**Composition****Major Components**

Toston and similar soils: 85 percent

**Minor Components**

Ryell sandy loam: 0 to 8 percent

Alona silt loam: 0 to 5 percent

Bonebasin loam: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Trimad Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Relict stream terraces, escarpments, alluvial fans, and stream terraces

*Parent material:* Alluvium or colluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 4,000 to 5,700 feet

*Annual precipitation:* 10 to 16 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 90 to 115 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Aridic Calciustolls

**Typical Pedon**

Trimad cobbly loam, 0 to 4 percent slopes, in an area of cropland, 900 feet north and 300 feet west of the southeast corner of sec. 3, T. 2 S., R. 1 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent cobbles and 10 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—5 to 19 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles and 10 percent pebbles; common distinct lime coatings on coarse fragments; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—19 to 25 inches; light gray (10YR 7/2) very cobbly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; common distinct lime coatings on coarse fragments; disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—25 to 60 inches; white (10YR 8/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; 15 percent cobbles and 30 percent pebbles; common distinct lime coatings on coarse fragments; few prominent lime casts on coarse fragments; disseminated lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to the Bk horizon:* 4 to 7 inches

*Ap horizon*

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 5 to 35 percent—5 to 15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

*Note:* Uncultivated areas may contain a Bw horizon.

**Bk1 horizon**

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 10 to 27 percent  
 Content of rock fragments: 15 to 50 percent—5 to 20 percent cobbles; 10 to 30 percent pebbles  
 Calcium carbonate equivalent: 10 to 15 percent  
 Reaction: pH 7.4 to 8.4

**Bk2 horizon**

Hue: 10YR or 2.5Y  
 Value: 6 or 7 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Texture: Loam or sandy loam  
 Clay content: 10 to 15 percent  
 Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles  
 Calcium carbonate equivalent: 15 to 25 percent  
 Reaction: pH 7.4 to 8.4

**Bk3 horizon**

Hue: 10YR or 2.5Y  
 Value: 6, 7, or 8 dry; 5 or 6 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 15 percent  
 Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles  
 Calcium carbonate equivalent: 10 to 25 percent  
 Reaction: pH 7.4 to 8.4

**242B—Trimad cobbly loam,  
0 to 4 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,300 to 5,250 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Trimad and similar soils: 85 percent

**Minor Components**

Binna loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Trimad very cobbly loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242C—Trimad cobbly loam,  
4 to 8 percent slopes**

**Setting**

*Landform:* Relict stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,050 to 5,000 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition**

**Major Components**

Trimad and similar soils: 85 percent

**Minor Components**

Binna loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Trimad very cobbly loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242D—Trimad cobbly loam,  
8 to 15 percent slopes****Setting**

*Landform:* Relict stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,250 to 5,350 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Trimad and similar soils: 85 percent

**Minor Components**

Binna loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Trimad very cobbly loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**242E—Trimad cobbly loam,  
15 to 35 percent slopes****Setting**

*Landform:* Escarpments  
*Slope:* 15 to 35 percent  
*Elevation:* 4,050 to 5,500 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Trimad and similar soils: 85 percent

**Minor Components**

Amesha loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Soils with slopes more than 35 percent: 0 to 3 percent  
 Cabbart loam: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**742F—Trimad cobbly loam, moist,  
35 to 60 percent slopes****Setting**

*Landform:* Escarpments  
*Slope:* 35 to 60 percent  
*Elevation:* 4,100 to 5,250 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

**Composition****Major Components**

Trimad and similar soils: 85 percent

**Minor Components**

Cabbart loam: 0 to 5 percent  
 Kalsted sandy loam: 0 to 5 percent  
 Quigley loam: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 42B—Trimad loam, 0 to 4 percent slopes

#### Setting

*Landform:* Relict stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,000 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Trimad and similar soils: 85 percent

##### Minor Components

Crago cobbly loam: 0 to 5 percent  
 Musselshell loam: 0 to 5 percent  
 Trimad cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 442B—Trimad loam, calcareous surface, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,200 to 4,400 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Trimad and similar soils: 85 percent

### Minor Components

Musselshell loam: 0 to 5 percent  
 Scravo cobbly sandy loam: 0 to 5 percent  
 Trimad cobbly 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:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Turner Series

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate above the 2C horizon and rapid in the 2C horizon  
*Landform:* Stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 4 percent  
*Elevation range:* 4,300 to 5,400 feet  
*Annual precipitation:* 15 to 19 inches  
*Annual air temperature:* 39 to 43 degrees F  
*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine-loamy over sandy or sandy skeletal, mixed, superactive, frigid Typic Argiustolls

#### Typical Pedon

Turner loam, 0 to 4 percent slopes, in an area of cropland, 1,900 feet south and 350 feet west of the northeast corner of sec. 17, T. 1 N., R. 5 E.

Ap—0 to 6 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, moderately sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; abrupt smooth boundary.

Bt—6 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, moderately

sticky, and moderately plastic; many very fine and common fine roots; 5 percent pebbles; slightly alkaline; abrupt smooth boundary.

**Bk1**—12 to 18 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; 2 percent cobbles and 10 percent pebbles; many medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

**Bk2**—18 to 22 inches; light yellowish brown (10YR 6/4) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 15 percent pebbles; common fine masses of lime; common distinct lime crusts on the underside of coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

**Bk3**—22 to 26 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 20 percent pebbles; common faint lime crusts on the underside of rock fragments; violently effervescent; moderately alkaline; clear smooth boundary.

**2C**—26 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 50 percent pebbles; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 15 inches

*Depth to the Bk horizon:* 11 to 20 inches

*Depth to the 2C horizon:* 20 to 40 inches

#### A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam, clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, clay loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### 2C horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 80 percent—5 to 20 percent cobbles; 30 to 60 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

## 57B—Turner loam, 0 to 4 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 4 percent

*Elevation:* 4,350 to 5,400 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Turner and similar soils: 85 percent

#### Minor Components

Beaverton cobbly loam: 0 to 5 percent

Corbly cobbly sandy loam: 0 to 5 percent

Martinsdale 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 457A—Turner loam, moderately wet, 0 to 2 percent slopes

### Setting

*Landform:* Stream terraces

*Slope:* 0 to 2 percent

*Elevation:* 4,300 to 5,200 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Turner and similar soils: 85 percent

#### Minor Components

Beaverton cobbly loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

Turner 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Udecide Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills, sedimentary plains, and escarpments

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 4 to 35 percent

*Elevation range:* 4,100 to 5,500 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aridic Argiustolls

### Typical Pedon

Udecide cobbly sandy clay loam, in an area of Udecide-Cabbart complex, 15 to 45 percent slopes, in an area of native rangeland, 1,600 feet south and 1,400 feet east of the northwest corner of sec. 20, T. 1 N., R. 1 E.

A—0 to 5 inches; grayish brown (10YR 5/2) cobbly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent cobbles and 10 percent pebbles; slightly alkaline; clear smooth boundary.

Bt1—5 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; common very fine and few medium roots; few faint clay films on faces of ped; slightly alkaline; clear smooth boundary.

Bt2—7 to 12 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; many faint clay films on faces of ped; slightly alkaline; clear smooth boundary.

Bk—12 to 32 inches; light gray (2.5Y 7/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common medium masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—32 to 60 inches; weakly consolidated sandstone.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to the Bk horizon:* 10 to 22 inches

*Depth to the Cr horizon:* 20 to 40 inches

*A horizon*

Hue: 10YR or 2.5Y  
 Value: 2 or 3 moist  
 Chroma: 2 or 3  
 Texture: Sandy clay loam, clay loam, or silt loam  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles  
 Reaction: pH 6.6 to 7.8

*Bt horizons*

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 4, 5, or 6 dry; 3 or 4 moist  
 Chroma: 2 or 3  
 Texture: Sandy clay loam or clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Reaction: pH 6.6 to 7.8

*Bk horizon*

Hue: 10YR or 2.5Y  
 Value: 5, 6, or 7 dry; 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Sandy loam or sandy clay loam  
 Clay content: 15 to 30 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 10 to 20 percent  
 Reaction: pH 7.9 to 8.4

### **24C—Udecide silt loam, 4 to 8 percent slopes**

#### **Setting**

*Landform:* Sedimentary plains  
*Slope:* 4 to 8 percent  
*Elevation:* 5,000 to 5,350 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

#### **Composition**

##### **Major Components**

Udecide and similar soils: 85 percent

##### **Minor Components**

Varney sandy clay loam: 0 to 10 percent  
 Cabbart loam: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **724C—Udecide-Cabbart complex, 4 to 8 percent slopes**

#### **Setting**

*Landform:*

- Udecide—Sedimentary plains
- Cabbart—Sedimentary plains

*Slope:*

- Udecide—4 to 8 percent
- Cabbart—4 to 8 percent

*Elevation:* 4,600 to 5,400 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### **Composition**

##### **Major Components**

Udecide and similar soils: 60 percent  
 Cabbart and similar soils: 25 percent

##### **Minor Components**

Varney clay loam: 0 to 10 percent  
 Headwaters loam: 0 to 5 percent

#### **Major Component Description**

##### **Udecide**

*Surface layer texture:* Sandy clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

##### **Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 724D—Udecide-Cabbart complex, 8 to 15 percent slopes

### Setting

*Landform:*

- Udecide—Hills
- Cabbart—Hills

*Slope:*

- Udecide—8 to 15 percent
- Cabbart—8 to 15 percent

*Elevation:* 4,150 to 5,500 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Udecide and similar soils: 60 percent

Cabbart and similar soils: 25 percent

#### Minor Components

Varney clay loam: 0 to 10 percent

Tanna clay loam: 0 to 5 percent

### Major Component Description

#### Udecide

*Surface layer texture:* Sandy clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

#### Cabbart

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 724E—Udecide-Cabbart complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Udecide—Escarpments
- Cabbart—Escarpments

*Slope:*

- Udecide—15 to 35 percent
- Cabbart—30 to 45 percent

*Elevation:* 4,150 to 5,500 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

### Composition

#### Major Components

Udecide and similar soils: 65 percent

Cabbart and similar soils: 20 percent

#### Minor Components

Varney clay loam: 0 to 8 percent

Amesha loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Udecide

*Surface layer texture:* Cobbly sandy clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

#### Cabbart

*Surface layer texture:* Cobbly sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Uinta Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains

*Parent material:* Argillite colluvium or interbedded sandstone and shale residuum

*Slope range:* 8 to 45 percent

*Elevation range:* 5,450 to 6,700 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-loamy, mixed, superactive  
Eutric Glossocryalfs

### Typical Pedon

Uinta loam, in an area of Uinta-Paddy complex, cool, 15 to 45 percent slopes, in an area of forest land, 4,100 feet north and 1,200 feet east of the southwest corner of sec. 11, T. 5 N., R. 4 E.

Oi—0 to 1 inch; undecomposed needles, twigs, grass, leaves, plants, and roots.

E—1 to 6 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 4/3) moist; moderate very fine and fine granular structure; soft, friable, slightly sticky, and slightly plastic; many fine and common medium roots; many very fine and fine pores; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

E/Bt—6 to 14 inches; reddish brown (2.5YR 5/4) clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, friable, moderately sticky, and moderately plastic; common fine and medium and few coarse roots; common very fine and fine pores; few faint clay films on faces of peds; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—14 to 23 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (2.5YR 4/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine, medium, and coarse roots; common fine

pores; many distinct clay films on faces of peds; 5 percent pebbles; slightly acid; gradual smooth boundary.

Bt2—23 to 32 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine, medium, and coarse roots; common fine pores; many distinct clay films on faces of peds; 5 percent pebbles; slightly acid; gradual smooth boundary.

Bt3—32 to 60 inches; reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure; slightly hard, firm, moderately sticky, and moderately plastic; few fine and medium roots; few fine pores; 10 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

#### E horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

#### E/Bt horizon

Hue: 5YR or 2.5YR

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 3 or 4

Texture: Loam or clay loam

Clay content: 20 to 30 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

#### Bt horizons

Hue: 5YR or 2.5YR

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

*Note:* The Uinta soil as mapped in Gallatin County is a taxadjunct to the series. It classifies as Fine-loamy, mixed, superactive Ustic Haplocryolls. Use and management is similar.

### 490E—Uinta-Paddy complex, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Uinta—Mountains
- Paddy—Mountains

##### *Slope:*

- Uinta—15 to 45 percent
- Paddy—15 to 45 percent

*Elevation:* 5,450 to 6,550 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Uinta and similar soils: 50 percent

Paddy and similar soils: 40 percent

##### Minor Components

Uinta very stony loam: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 4 percent

Rock outcrop: 0 to 1 percent

#### Major Component Description

##### Uinta

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

##### Paddy

*Surface layer texture:* Clay loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 390E—Uinta-Paddy complex, cool, 15 to 45 percent slopes

#### Setting

##### *Landform:*

- Uinta—Mountains
- Paddy—Mountains

##### *Slope:*

- Uinta—15 to 45 percent
- Paddy—15 to 45 percent

*Elevation:* 5,800 to 6,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

#### Composition

##### Major Components

Uinta and similar soils: 50 percent

Paddy and similar soils: 40 percent

##### Minor Components

Uinta stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

#### Major Component Description

##### Uinta

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

##### Paddy

*Surface layer texture:* Clay loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Argillite residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**UL—Urban land****Composition****Major Components**

Urban land: 100 percent

**Major Component Description**

*Definition:* Urban, built-up areas, mostly covered with asphalt, concrete, and buildings.

**Varney Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Relict stream terraces and alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Elevation range:* 3,950 to 5,300 feet

*Annual precipitation:* 10 to 14 inches

*Annual air temperature:* 41 to 45 degrees F

*Frost-free period:* 95 to 115 days

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Calcic Argiustolls

**Typical Pedon**

Varney clay loam, 0 to 4 percent slopes, in an area of cropland, 2,200 feet south and 300 feet east of the northwest corner of sec. 32, T. 1 N., R. 1 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure; hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly alkaline; clear smooth boundary.

Bt1—4 to 10 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; slightly alkaline; clear irregular boundary.

Bt2—10 to 16 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 4/3) moist; strong medium angular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct

clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bk1—16 to 24 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; soft, very friable, moderately sticky, and slightly plastic; common fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—24 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; few fine masses of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 7 to 10 inches

*Depth to the Bk horizon:* 10 to 20 inches

**Ap horizon**

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

**Bt horizons**

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

**Bk horizons**

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, sandy clay loam, or clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent  
Reaction: pH 7.4 to 8.4

#### **44B—Varney clay loam, 0 to 4 percent slopes**

##### **Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 4,100 to 5,200 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

##### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Attewan loam: 0 to 5 percent  
Sappington loam: 0 to 5 percent  
Soils with slopes more than 4 percent: 0 to 5 percent

##### **Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

##### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **44C—Varney clay loam, 4 to 8 percent slopes**

##### **Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 4 to 8 percent  
*Elevation:* 3,950 to 5,350 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

##### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Amesha loam: 0 to 5 percent  
Sappington loam: 0 to 5 percent  
Soils with slopes more than 8 percent: 0 to 5 percent

##### **Major Component Description**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

##### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **244B—Varney cobbly loam, 0 to 4 percent slopes**

##### **Setting**

*Landform:* Relict stream terraces and alluvial fans  
*Slope:* 0 to 4 percent  
*Elevation:* 4,600 to 5,150 feet  
*Mean annual precipitation:* 10 to 14 inches  
*Frost-free period:* 95 to 115 days

##### **Composition**

##### **Major Components**

Varney and similar soils: 85 percent

##### **Minor Components**

Amesha loam: 0 to 5 percent  
Sappington cobbly loam: 0 to 5 percent  
Varney very cobbly loam: 0 to 5 percent

##### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.4 inches

A typical description with range in characteristics is 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—Varney sandy clay loam, 8 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces and alluvial fans

*Slope:* 8 to 15 percent

*Elevation:* 4,100 to 5,350 feet

*Mean annual precipitation:* 10 to 14 inches

*Frost-free period:* 95 to 115 days

#### Composition

##### Major Components

Varney and similar soils: 85 percent

##### Minor Components

Sappington loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Udecide sandy clay loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Sandy clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Vision Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains and hills

*Parent material:* Sandstone colluvium

*Slope range:* 15 to 60 percent

*Elevation range:* 4,300 to 6,850 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

### Typical Pedon

Vision cobbly loam, 15 to 45 percent slopes, very stony, in an area of forest land, 1,300 feet north and 1,800 feet east of the southwest corner of sec. 33, T. 5 N., R. 4 E.

A—0 to 7 inches; grayish brown (10YR 5/2) cobbly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent stones, 10 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

Bt1—7 to 13 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, moderately sticky, and slightly plastic; many very fine, common fine, and few medium roots; common distinct clay films on faces of peds; 5 percent stones, 10 percent cobbles, and 20 percent pebbles; slightly acid; clear smooth boundary.

Bt2—13 to 24 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds; 5 percent stones, 15 percent cobbles, and 30 percent pebbles; slightly acid; clear wavy boundary.

Bt3—24 to 60 inches; pale brown (10YR 6/3) extremely stony clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films on faces of peds; 30 percent stones, 20 percent cobbles, and 25 percent pebbles; slightly acid.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bt horizon:* 5 to 12 inches

*Note:* The dark-colored A horizon is too thin to classify as a mollisol.

#### A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 50 percent—3 to 5 percent stones; 5 to 10 percent cobbles; 5 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

*Bt1 horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, loam, or sandy clay loam

Clay content: 20 to 30 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 6.1 to 7.3

*Bt2 and Bt3 horizons*

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, loam, sandy clay loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 30 percent stones; 5 to 20 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 6.1 to 7.3

**388E—Vision cobbly loam,  
15 to 45 percent slopes, very stony**

**Setting**

*Landform:* Mountains

*Slope:* 15 to 45 percent

*Elevation:* 4,400 to 6,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Vision and similar soils: 85 percent

**Minor Components**

Tolbert very stony loam: 0 to 10 percent

Rubble land: 0 to 5 percent

**Major Component Description**

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**839F—Vision, very stony-Tolbert,  
very stony-Rubble land complex,  
35 to 60 percent slopes**

**Setting**

*Landform:*

- Vision—Hills
- Tolbert—Hills
- Rubble land—Hills

*Slope:*

- Vision—35 to 60 percent
- Tolbert—35 to 60 percent

*Elevation:* 4,300 to 6,850 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

**Composition**

**Major Components**

Vision and similar soils: 40 percent

Tolbert and similar soils: 30 percent

Rubble land: 20 percent

**Minor Components**

Soils 20 to 40 inches deep to bedrock: 0 to 7 percent

Rock outcrop: 0 to 3 percent

**Major Component Description**

**Vision**

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

**Tolbert**

*Surface layer texture:* Cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

**Rubble land**

*Definition:* Areas with more than 90 percent of the surface covered by boulders or stones.

A typical description with range in characteristics is 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.

**Whitecow Series**

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate

*Landform:* Mountains

*Parent material:* Limestone colluvium

*Slope range:* 35 to 60 percent

*Elevation range:* 4,500 to 7,000 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Loamy-skeletal, carbonatic, frigid  
Typic Calcustepts

**Typical Pedon**

Whitecow cobbly loam, in an area of Whitecow, stony-Lap, very stony-Rock outcrop complex, 35 to 60 percent slopes, in an area of forest land, 1,850 feet south and 2,900 feet west of the northeast corner of sec. 21, T. 5 N., R. 4 E.

Oi—0 to 2 inches; undecomposed forest litter.

A—2 to 6 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; common very fine pores; 10 percent cobbles and 10 percent pebbles; slightly alkaline; abrupt smooth boundary.

AB—6 to 12 inches; brown (10YR 5/3) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and few medium and coarse roots; common very fine and fine pores; 10 percent stones and 30 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—12 to 22 inches; pale brown (10YR 6/3) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common very fine and fine pores; 10 percent stones and 40 percent pebbles; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—22 to 32 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few fine roots; common fine pores; 10 percent stones and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—32 to 60 inches; light gray (10YR 7/2) very gravelly loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, and nonplastic; common fine and medium pores; 15 percent stones and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

**Range in Characteristics**

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 4 to 25 inches

**A and AB horizons**

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 7.4 to 8.4

**Bk horizons**

Hue: 10YR and 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent stones; 35 to 60 percent pebbles  
 Calcium carbonate equivalent: 40 to 50 percent  
 Reaction: pH 7.9 to 8.4

### **86F—Whitecow cobbly loam, 35 to 60 percent slopes, stony**

#### **Setting**

*Landform:* Mountains  
*Slope:* 35 to 60 percent  
*Elevation:* 4,600 to 7,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Whitecow and similar soils: 90 percent

##### **Minor Components**

Lap very stony loam: 0 to 5 percent  
 Rock outcrop: 0 to 3 percent  
 Soils with slopes more than 60 percent: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **786F—Whitecow, stony-Lap, very stony-Rock outcrop complex, 35 to 60 percent slopes**

#### **Setting**

*Landform:*

- Whitecow—Mountains
- Lap—Mountains
- Rock outcrop—Mountains

*Slope:*

- Whitecow—35 to 60 percent
- Lap—35 to 60 percent

*Elevation:* 4,500 to 7,300 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Whitecow and similar soils: 50 percent  
 Lap and similar soils: 20 percent  
 Rock outcrop: 20 percent

##### **Minor Components**

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent  
 Rubble land: 0 to 2 percent

#### **Major Component Description**

##### **Whitecow**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.8 inches

##### **Lap**

*Surface layer texture:* Very cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.1 inches

##### **Rock outcrop**

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Whitore Series**

*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate  
*Landform:* Mountains  
*Parent material:* Limestone colluvium  
*Slope range:* 15 to 70 percent  
*Elevation range:* 4,400 to 8,600 feet  
*Annual precipitation:* 20 to 30 inches  
*Annual air temperature:* 34 to 38 degrees F  
*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Loamy-skeletal, carbonatic Typic Eutrocryepts

### Typical Pedon

Whitore gravelly loam, 35 to 60 percent slopes, stony, in an area of forest land, 1,800 feet south and 200 feet east of the northwest corner of sec. 21, T. 5 N., R. 4 E.

Oi—0 to 1 inch; undecomposed forest litter.

A—1 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2 moist); weak medium subangular blocky structure parting to moderate fine and very fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common very fine pores; 5 percent stones and 20 percent pebbles; slightly alkaline; abrupt smooth boundary.

Bw—3 to 15 inches; light brownish gray (10YR 6/2) very gravelly loam, dark brown (10YR 3/3 moist); moderate fine and very fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common fine and medium roots; common very fine and fine pores; 5 percent cobbles and 40 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—15 to 27 inches; light gray (10YR 7/2) very gravelly loam, pale brown (10YR 6/3 moist); weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium roots, some forming horizontal mats; common very fine and fine pores; 10 percent cobbles and 45 percent pebbles; common distinct lime concretions on fragments; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—27 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4 moist); weak coarse prismatic structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; few fine and medium roots; common fine pores; 15 percent cobbles and 40 percent pebbles; common distinct lime concretions on fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 5 to 15 inches

#### A horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 10 to 35 percent—2 to 5 percent stones; 0 to 15 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bw horizon

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 15 to 50 percent—5 to 10 percent cobbles; 10 to 40 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

#### Bk horizons

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 40 to 70 percent—5 to 20 percent cobbles; 35 to 50 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.4 to 8.4

## 291G—Whitore cobbly clay loam, 40 to 70 percent slopes, stony

### Setting

*Landform:* Mountains

*Slope:* 40 to 70 percent

*Elevation:* 5,200 to 7,600 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Whitore and similar soils: 90 percent

#### Minor Components

Sicklesteets stony clay loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 4 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Gravelly clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 91F—Whitore gravelly loam, 35 to 60 percent slopes, stony

### Setting

*Landform:* Mountains

*Slope:* 35 to 60 percent

*Elevation:* 5,000 to 7,650 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Whitore and similar soils: 85 percent

#### Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 60 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 991F—Whitore-Rock outcrop complex, 35 to 70 percent slopes

### Setting

*Landform:*

- Whitore—Mountains
- Rock outcrop—Mountains

*Slope:* 35 to 70 percent

*Elevation:* 4,700 to 8,600 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Whitore and similar soils: 70 percent

Rock outcrop: 20 percent

#### Minor Components

Accola loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

### Major Component Description

#### Whitore

*Surface layer texture:* Gravelly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

#### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is 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—Whitore-Sicklesteets complex, 15 to 40 percent slopes, stony

### Setting

*Landform:*

- Whitore—Mountains
- Sicklesteets—Mountains

*Slope:*

- Whitore—15 to 40 percent
- Sicklesteets—15 to 40 percent

*Elevation:* 5,250 to 7,700 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Whitore and similar soils: 50 percent

Sicklesteets and similar soils: 40 percent

**Minor Components**

Accola loam: 0 to 5 percent  
Soils less than 40 inches deep to bedrock: 0 to 5 percent

**Major Component Description****Whitore**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

**Sicklesteets**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Dolomite colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**691F—Whitore-Sicklesteets complex, 40 to 60 percent slopes, stony****Setting***Landform:*

- Whitore—Mountains
- Sicklesteets—Mountains

*Slope:*

- Whitore—40 to 60 percent
- Sicklesteets—40 to 60 percent

*Elevation:* 5,150 to 7,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

**Composition****Major Components**

Whitore and similar soils: 50 percent  
Sicklesteets and similar soils: 40 percent

**Minor Components**

Soils less than 20 inches deep to bedrock: 0 to 8 percent  
Rock outcrop: 0 to 2 percent

**Major Component Description****Whitore**

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

**Sicklesteets**

*Surface layer texture:* Cobbly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Dolomite colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Wilsall Series**

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Slow

*Landform:* Hills and sedimentary plains

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 2 to 45 percent

*Elevation range:* 4,400 to 6,800 feet

*Annual precipitation:* 15 to 22 inches

*Annual air temperature:* 37 to 43 degrees F

*Frost-free period:* 80 to 110 days

**Taxonomic Class:** Clayey, smectitic, frigid, shallow  
Typic Argiustolls

**Typical Pedon**

Wilsall clay loam, in an area of Billman-Wilsall clay loams, 8 to 25 percent slopes, in an area of rangeland, 900 feet south and 700 feet east of the northwest corner of sec. 21, T. 1 S., R. 7 E.

- A—0 to 3 inches; dark grayish brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable, very sticky, and very plastic; many very fine and fine and common medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.
- Bt—3 to 10 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky, and very plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; slightly alkaline; clear wavy boundary.
- Cr1—10 to 15 inches; semiconsolidated shale, grayish brown (10YR 5/2) moist; violently effervescent.
- Cr2—15 to 60 inches; gray (5Y 5/1) semiconsolidated shale, dark gray (5Y 4/1) moist; violently effervescent.

### Range in Characteristics

- Soil temperature:* 39 to 45 degrees F
- Moisture control section:* Between 4 and 12 inches or between 4 inches and the paralithic contact
- Mollic epipedon thickness:* 6 to 12 inches, including all or part of the argillic horizon
- Depth to weakly consolidated shale or sandstone:* 10 to 20 inches
- A horizon*
- Hue: 5YR, 7.5YR, or 10YR
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 30 to 40 percent
- Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles
- Reaction: pH 6.6 to 7.3

- Bt horizon*
- Hue: 5YR, 7.5YR, or 10YR
- Value: 4 or 5 dry; 3 or 4 moist
- Chroma: 2 or 3
- Texture: Clay loam, clay, or silty clay
- Clay content: 35 to 55 percent
- Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles
- Reaction: pH 6.6 to 7.8

### Windham Series

- Depth class:* Very deep (more than 60 inches)
- Drainage class:* Well drained
- Permeability:* Moderate

*Landform:* Alluvial fans, stream terraces, and hills

*Parent material:* Limestone alluvium or limestone colluvium

*Slope range:* 0 to 60 percent

*Elevation range:* 4,150 to 7,100 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-skeletal, carbonatic, frigid Typic Calciustolls

### Typical Pedon

Windham gravelly loam, 8 to 15 percent slopes, in an area of rangeland, 100 feet south and 300 feet west of the northeast corner of sec. 17, T. 3 N., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent cobbles and 15 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk1—6 to 14 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 15 percent pebbles; disseminated lime, common distinct lime crusts and pendants on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—14 to 60 inches; white (10YR 8/2) extremely cobbly loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 30 percent cobbles and 40 percent pebbles; disseminated lime, common distinct lime crusts and pendants on rock fragments; violently effervescent; moderately alkaline.

### Range in Characteristics

- Soil temperature:* 41 to 45 degrees F
- Moisture control section:* Between 4 and 12 inches
- Mollic epipedon thickness:* 7 to 10 inches
- Depth to the calcic horizon:* 7 to 10 inches

- A horizon*
- Hue: 7.5YR or 10YR
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 1, 2, or 3
- Clay content: 18 to 27 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent pebbles  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

**Bk1 horizon**

Hue: 7.5YR or 10YR  
 Value: 4, 5, or 6 dry; 3, 4, 5, or 6 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 15 to 60 percent—5 to 20 percent cobbles; 10 to 40 percent pebbles  
 Calcium carbonate equivalent: 35 to 60 percent  
 Reaction: pH 7.9 to 8.4

**Bk2 horizon**

Hue: 7.5YR, 10YR, or 2.5Y  
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist  
 Chroma: 2, 3, or 4  
 Texture: Loam or sandy loam  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 35 to 70 percent—5 to 30 percent cobbles; 20 to 40 percent pebbles  
 Calcium carbonate equivalent: 40 to 60 percent  
 Reaction: pH 7.9 to 8.4

### **266B—Windham cobbly loam, 0 to 4 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 4 percent  
*Elevation:* 4,750 to 6,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Windham and similar soils: 90 percent

##### **Minor Components**

Windham very cobbly loam: 0 to 5 percent  
 Beanlake loam: 0 to 3 percent  
 Soils with slopes more than 4 percent: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **266D—Windham cobbly loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,850 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

#### **Composition**

##### **Major Components**

Windham and similar soils: 90 percent

##### **Minor Components**

Windham very cobbly loam: 0 to 5 percent  
 Beanlake loam: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **366D—Windham cobbly loam, 8 to 15 percent slopes, stony**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,500 to 6,250 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 90 percent

#### Minor Components

Soils with slopes more than 15 percent: 0 to 5 percent  
Windham bouldery loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is 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—Windham cobbly loam, 15 to 35 percent slopes, stony

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 15 to 35 percent  
*Elevation:* 4,600 to 6,400 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 90 percent

#### Minor Components

Soils with slopes more than 35 percent: 0 to 5 percent  
Windham bouldery loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 466E—Windham cobbly loam, 15 to 45 percent slopes, stony

#### Setting

*Landform:* Hills  
*Slope:* 15 to 45 percent  
*Elevation:* 4,550 to 7,000 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 85 percent

#### Minor Components

Lap stony loam: 0 to 8 percent  
Soils with slopes more than 45 percent: 0 to 5 percent  
Rock outcrop: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 166C—Windham gravelly loam, 4 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 4 to 8 percent  
*Elevation:* 4,500 to 6,100 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 85 percent

#### Minor Components

Beanlake loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Windham cobbly 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 166D—Windham gravelly loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,450 to 5,650 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 85 percent

#### Minor Components

Beanlake loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Windham cobbly 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:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 866E—Windham, stony-Hanson-Lap, stony complex, 8 to 35 percent slopes

### Setting

*Landform:*

- Windham—Hills
- Hanson—Hills
- Lap—Hills

*Slope:*

- Windham—8 to 35 percent
- Hanson—8 to 35 percent
- Lap—8 to 35 percent

*Elevation:* 4,700 to 7,000 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Windham and similar soils: 40 percent

Hanson and similar soils: 35 percent

Lap and similar soils: 15 percent

#### Minor Components

Soils with slopes more than 35 percent: 0 to 6 percent

Rock outcrop: 0 to 4 percent

### Major Component Description

#### Windham

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

#### Hanson

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

### Lap

*Surface layer texture:* Cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 666E—Windham, stony-Lap, very stony complex, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Windham—Hills
- Lap—Hills

#### *Slope:*

- Windham—15 to 45 percent
- Lap—15 to 45 percent

*Elevation:* 4,400 to 6,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 65 percent

Lap and similar soils: 20 percent

#### Minor Components

Rock outcrop: 0 to 5 percent

Soils 20- to 40-inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

### Major Component Description

#### Windham

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 5.2 inches

### Lap

*Surface layer texture:* Very cobbly loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 766E—Windham, stony-Lap, very stony-Hanson complex, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Windham—Hills
- Lap—Hills
- Hanson—Hills

#### *Slope:*

- Windham—15 to 45 percent
- Lap—15 to 45 percent
- Hanson—15 to 45 percent

*Elevation:* 5,650 to 7,100 feet

*Mean annual precipitation:* 17 to 22 inches

*Frost-free period:* 65 to 100 days

### Composition

#### Major Components

Windham and similar soils: 45 percent

Lap and similar soils: 25 percent

Hanson and similar soils: 20 percent

#### Minor Components

Rock outcrop: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

### Major Component Description

#### Windham

*Surface layer texture:* Cobbly loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Limestone colluvium  
*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

### Lap

*Surface layer texture:* Very cobbly loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.1 inches

### Hanson

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 966E—Windham, stony-Rock outcrop complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Windham—Hills
- Rock outcrop—Hills

*Slope:* 15 to 45 percent

*Elevation:* 5,150 to 6,800 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Windham and similar soils: 65 percent

Rock outcrop: 20 percent

#### Minor Components

Lap very stony loam: 0 to 10 percent

Hanson loam, moist: 0 to 5 percent

### Major Component Description

#### Windham

*Surface layer texture:* Cobbly loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Limestone colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 5.2 inches

### Rock outcrop

*Definition:* Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Work Series

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills, alluvial fans, and stream terraces

*Parent material:* Alluvium or colluvium

*Slope range:* 4 to 35 percent

*Elevation range:* 4,500 to 6,150 feet

*Annual precipitation:* 15 to 19 inches

*Annual air temperature:* 39 to 43 degrees F

*Frost-free period:* 90 to 110 days

**Taxonomic Class:** Fine, smectitic, frigid Typic Argiustolls

### Typical Pedon

Work clay loam, 8 to 15 percent slopes, in an area of hayland, 800 feet south and 1,000 feet east of the northwest corner of sec. 12, T. 3 N., R. 4 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) clay loam; very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure parting to moderate fine granular; hard, very firm, moderately sticky, and moderately plastic; common fine and few medium roots; 10 percent pebbles; neutral; abrupt smooth boundary.

Bt1—5 to 9 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, and moderately plastic; many distinct clay films on faces of peds and lining pores; common very fine and few fine roots; 10 percent pebbles; neutral; abrupt smooth boundary.

**Bt2**—9 to 13 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; hard, very firm, moderately sticky, and moderately plastic; common distinct clay films on faces of peds; common very fine roots; 5 percent pebbles; neutral; clear wavy boundary.

**Bk1**—13 to 30 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**Bk2**—30 to 38 inches; light brownish gray (10YR 6/2) gravelly clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 15 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

**Bk3**—38 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 45 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 16 inches

*Depth to the Bk horizon:* 12 to 30 inches

#### *Ap horizon*

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bt horizons*

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

#### *Bk horizons*

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

### **46C—Work clay loam, 4 to 8 percent slopes**

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 4 to 8 percent

*Elevation:* 4,500 to 5,900 feet

*Mean annual precipitation:* 15 to 19 inches

*Frost-free period:* 90 to 110 days

#### Composition

##### Major Components

Work and similar soils: 85 percent

##### Minor Components

Burnel clay loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Work gravelly clay loam: 0 to 5 percent

#### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### **46D—Work clay loam, 8 to 15 percent slopes**

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Elevation:* 4,500 to 5,850 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Work and similar soils: 85 percent

#### Minor Components

Work gravelly clay loam: 0 to 10 percent  
 Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 346E—Work cobbly sandy clay loam, 15 to 35 percent slopes, stony

### Setting

*Landform:* Hills  
*Slope:* 15 to 35 percent  
*Elevation:* 5,150 to 5,750 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Work and similar soils: 90 percent

#### Minor Components

Reedwest sandy clay loam: 0 to 5 percent  
 Work very stony loam: 0 to 3 percent  
 Cabba sandy loam: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Cobbly sandy clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or colluvium  
*Native plant cover type:* Rangeland

*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 146D—Work gravelly clay loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Elevation:* 4,550 to 6,150 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Frost-free period:* 90 to 110 days

### Composition

#### Major Components

Work and similar soils: 85 percent

#### Minor Components

Soils with slopes more than 15 percent: 0 to 5 percent  
 Tamaneen clay loam: 0 to 5 percent  
 Work cobbly clay loam: 0 to 5 percent

### Major Component Description

*Surface layer texture:* Gravelly clay loam  
*Depth class:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Yellowmule Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow  
*Landform:* Mountains and hills  
*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 4 to 60 percent

*Elevation range:* 5,200 to 8,800 feet

*Annual precipitation:* 25 to 30 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 30 to 70 days

**Taxonomic Class:** Fine, mixed, superactive Eutric  
Haplocryalfs

### Typical Pedon

Yellowmule loam, in an area of Yellowmule-Ousefal complex, 8 to 25 percent slopes, in an area of forest land, 2,500 feet south and 1,900 feet west of the northeast corner of sec. 10, T. 7 S., R. 3 E.

Oi—0 to 1 inch; slightly decomposed leaves, needles, and twigs.

E1—1 to 7 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak fine angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; 10 percent channers; slightly acid; clear wavy boundary.

E2—7 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; 10 percent channers; moderately acid; clear wavy boundary.

Bt1—11 to 20 inches; light brownish gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; strong medium subangular blocky structure; hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; common distinct clay films on faces of peds and lining pores; 5 percent channers; moderately acid; gradual wavy boundary.

Bt2—20 to 31 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common very fine and few fine and medium pores;

common distinct clay films on faces of peds and lining pores; 5 percent channers, 20 percent soft shale chips; neutral; gradual wavy boundary.  
Cr—31 to 60 inches; olive (5Y 5/3) semiconsolidated shale; neutral.

### Range in Characteristics

*Soil temperature:* 34 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### E1 horizon

Value: 5, 6, or 7 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 5 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 6.5

#### E2 horizon

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent stones; 0 to 5 percent flagstones; 0 to 10 percent channers

Reaction: pH 5.6 to 6.5

#### Bt1 horizon

Value: 5, 6, 7, or 8 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 25 percent—0 to 10 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 6.5

#### Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2, 3, 4, 5, or 6

Texture: Clay loam, clay, sandy clay loam, or sandy clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 25 percent—0 to 10 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 7.3

## 294F—Yellowmule-Lonniebee complex, 35 to 60 percent slopes, stony

### Setting

#### Landform:

- Yellowmule—Mountains
- Lonniebee—Mountains

#### Slope:

- Yellowmule—35 to 60 percent
- Lonniebee—35 to 60 percent

*Elevation:* 5,200 to 6,650 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Yellowmule and similar soils: 50 percent

Lonniebee and similar soils: 35 percent

#### Minor Components

Cowood channery sandy loam: 0 to 8 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Redlodge clay loam: 0 to 1 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

#### Yellowmule

*Surface layer texture:* Channery loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

#### Lonniebee

*Surface layer texture:* Flaggy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 294E—Yellowmule-Lonniebee, stony complex, 15 to 45 percent slopes

### Setting

#### Landform:

- Yellowmule—Mountains
- Lonniebee—Mountains

#### Slope:

- Yellowmule—15 to 45 percent
- Lonniebee—15 to 45 percent

*Elevation:* 5,200 to 6,950 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Yellowmule and similar soils: 65 percent

Lonniebee and similar soils: 20 percent

#### Minor Components

Redlodge silty clay loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Cowood channery sandy loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Yellowmule

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

#### Lonniebee

*Surface layer texture:* Flaggy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 294D—Yellowmule-Lonniebee, stony-Redlodge complex, 4 to 15 percent slopes

### Setting

*Landform:*

- Yellowmule—Hills
- Lonniebee—Hills
- Redlodge—Closed depressions

*Slope:*

- Yellowmule—4 to 15 percent
- Lonniebee—4 to 15 percent
- Redlodge—4 to 6 percent

*Elevation:* 5,950 to 6,300 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Yellowmule and similar soils: 60 percent

Lonniebee and similar soils: 20 percent

Redlodge and similar soils: 10 percent

#### Minor Components

Cowood channery sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

### Major Component Description

#### Yellowmule

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

#### Lonniebee

*Surface layer texture:* Flaggy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 3.2 inches

#### Redlodge

*Surface layer texture:* Silty clay

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Poorly drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Water table:* Apparent

*Available water capacity:* Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 492E—Yellowmule-Ouselfal complex, 8 to 25 percent slopes

### Setting

*Landform:*

- Yellowmule—Mountains
- Ouselfal—Mountains

*Slope:*

- Yellowmule—8 to 25 percent
- Ouselfal—8 to 25 percent

*Elevation:* 6,400 to 7,900 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Yellowmule and similar soils: 50 percent

Ouselfal and similar soils: 35 percent

#### Minor Components

Cowood channery sandy loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Rock outcrop: 0 to 1 percent

Rubble land: 0 to 1 percent

### Major Component Description

#### Yellowmule

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 4.9 inches

### **Ouselfal**

*Surface layer texture:* Very channery sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Forest land  
*Flooding:* None  
*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **592E—Yellowmule-Ouselfal, very stony complex, 8 to 25 percent slopes**

### **Setting**

#### *Landform:*

- Yellowmule—Mountains
- Ouselfal—Mountains

#### *Slope:*

- Yellowmule—8 to 25 percent
- Ouselfal—8 to 25 percent

*Elevation:* 7,800 to 8,800 feet

*Mean annual precipitation:* 25 to 30 inches

*Frost-free period:* 30 to 55 days

### **Composition**

#### **Major Components**

Yellowmule and similar soils: 50 percent

Ouselfal and similar soils: 35 percent

#### **Minor Components**

Cowood channery sandy loam: 0 to 10 percent

Soils with slopes more than 25 percent: 0 to 5 percent

### **Major Component Description**

#### **Yellowmule**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

### **Ouselfal**

*Surface layer texture:* Very flaggy sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Zade Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Landform:* Hills

*Parent material:* Interbedded sandstone and shale residuum

*Slope range:* 15 to 70 percent

*Elevation range:* 4,950 to 7,100 feet

*Annual precipitation:* 20 to 24 inches

*Annual air temperature:* 34 to 38 degrees F

*Frost-free period:* 50 to 70 days

**Taxonomic Class:** Fine-Loamy, mixed, superactive Ustic Argicryolls

### **Typical Pedon**

Zade loam, in an area of Zade-Timberlin, stony complex, 35 to 60 percent slopes, in an area of forest land, 1,800 feet south and 500 feet east of the northwest corner of sec. 12, T. 1 N., R. 7 E.

Oi—0 to 1 inch; slightly decomposed forest litter.

A—1 to 10 inches; dark gray (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; neutral; clear smooth boundary.

Bt1—10 to 16 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few medium roots; common distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Bt2—16 to 37 inches; brown (10YR 4/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; gradual wavy boundary.

Cr—37 to 60 inches; olive (5Y 5/3) interbedded soft sandstone and shale.

### Range in Characteristics

*Soil temperature:* 36 to 40 degrees F

*Moisture control section:* Between 4 and 12 inches

*Mollic epipedon thickness:* 10 to 16 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### A horizon

Value: 2 or 3 moist

Chroma: 1 or 2

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

#### Bt1 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

#### Bt2 horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 3 or 4

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

## 283G—Zade loam, 45 to 70 percent slopes

### Setting

*Landform:* Hills

*Slope:* 45 to 70 percent

*Elevation:* 4,950 to 5,850 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

### Composition

#### Major Components

Zade and similar soils: 90 percent

#### Minor Components

Timberlin stony loam: 0 to 4 percent

Copenhaver moist flaggy loam: 0 to 3 percent

Soils with slopes less than 45 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 283E—Zade-Adel complex, 15 to 45 percent slopes

### Setting

*Landform:*

- Zade—Hills

- Adel—Hills

*Slope:*

- Zade—15 to 45 percent

- Adel—15 to 45 percent

*Elevation:* 5,050 to 6,600 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Zade and similar soils: 70 percent

Adel and similar soils: 20 percent

### Minor Components

Timberlin stony loam: 0 to 4 percent

Copenhaver moist flaggy loam: 0 to 3 percent

Soils with slopes more than 45 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

### Major Component Description

#### Zade

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

#### Adel

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or colluvium

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 483F—Zade-Timberlin, stony complex, 35 to 60 percent slopes

#### Setting

*Landform:*

- Zade—Hills
- Timberlin—Hills

*Slope:*

- Zade—35 to 60 percent
- Timberlin—35 to 60 percent

*Elevation:* 5,000 to 7,100 feet

*Mean annual precipitation:* 20 to 24 inches

*Frost-free period:* 50 to 70 days

## Composition

### Major Components

Zade and similar soils: 70 percent

Timberlin and similar soils: 20 percent

### Minor Components

Copenhaver flaggy loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

### Major Component Description

#### Zade

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 6.2 inches

#### Timberlin

*Surface layer texture:* Flaggy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Forest land

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.



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# Glossary

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**Ablation till.** Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** (See Sodic (alkali) soil.)

**Alluvial fan.** A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

**Animal-unit-month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redox features.

**Area reclaim (in tables).** An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Argillite.** Weakly metamorphosed mudstone or shale.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3.75
Low .....	3.75 to 5.0
Moderate .....	5.0 to 7.5
High .....	more than 7.5

**Avalanche chute.** The track or path formed by an avalanche.

**Backslope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular

to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding planes.** Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-floored plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Bouldery.** Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

**Bouldery soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management.** Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

**Channery soil material.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

- Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
- Cirque.** A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clayey soil.** Silty clay, sandy clay, or clay.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- Clearcut.** A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
- Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
- Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.
- COLE (coefficient of linear extensibility).** (See Linear extensibility.)
- Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Commercial forest.** Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
- Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.
- Conglomerate.** A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.
- Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.
- Conservation tillage.** Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.
- Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 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 salt (in tables).** Excess water-soluble salts in the soil that restrict the growth of most plants.
- 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.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
- Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
- First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.
- Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
- Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.
- Foothill.** A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.
- Footslope.** The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.
- Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.
- Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.
- Frost action (in tables).** Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Giant ripple mark.** The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

- Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.
- Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.
- Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.
- Glaciated uplands.** Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.
- Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.
- Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.
- Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
- Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
- Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
- Gravelly soil material.** Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.
- Grazeable forestland.** Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.
- Green manure crop (agronomy).** A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.
- Ground water.** Water filling all the unblocked pores of the material below the water table.
- Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
- Gypsum.** A mineral consisting of hydrous calcium sulfate.
- Habitat type.** An aggregation of all land areas capable of producing similar climax plant communities.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.
- Head out.** To form a flower head.
- Heavy metal.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.
- Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.
- High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.
- Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well-decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties

include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 .....	very low
0.2 to 0.4 .....	low
0.4 to 0.75 .....	moderately low
0.75 to 1.25 .....	moderate
1.25 to 1.75 .....	moderately high
1.75 to 2.5 .....	high
More than 2.5 .....	very high

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

**Kame terrace.** A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake plain.** A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones (in tables).** Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Lateral moraine.** A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It

is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess.** Fine-grained material, dominantly of silt-sized particles, deposited by wind.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

**Mean annual increment (MAI).** The average annual increase in volume of a tree during its entire life.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Microhigh.** An area that is 2 to 12 inches higher than the adjacent microlow.

**Microlow.** An area that is 2 to 12 inches lower than the adjacent microhigh.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Miscellaneous water.** A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine.** An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

**Mountain.** A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep

sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

**Muck.** Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Naturalized pasture.** Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Observed rooting depth.** Depth to which roots have been observed to penetrate.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Outwash plain.** An extensive area of glaciofluvial material that was deposited by meltwater streams.

**Overstory.** The trees in a forest that form the upper crown cover.

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots.

For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil, adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile.

*Terms describing permeability are:*

Very slow .....	less than 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Piping (in tables).** Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

**Playa.** The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter (in tables).** Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

**Poorly graded.** Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potential natural community (PNC).** The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

**Potential rooting depth (effective rooting depth).**

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Quartzite, metamorphic.** Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

**Quartzite, sedimentary.** Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

**Range condition.** The present composition of the plant community on a range site in relation to the

potential natural plant community for that site. (See Similarity index.)

**Range site.** (See Ecological site.)

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Recessional moraine.** A moraine formed during a temporary but significant halt in the retreat of a glacier.

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redox concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redox depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redox features.** Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a

change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

**Regeneration.** The new growth of a natural plant community, developing from seed.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Riser.** The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rooting depth (in tables).** Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Rubble land.** Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called

ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline .....	0 to 4
Slightly saline .....	4 to 8
Moderately saline .....	8 to 16
Strongly saline .....	more than 16

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sawlogs.** Logs of suitable size and quality for the production of lumber.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Scribner's log rule.** A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

**Sedimentary plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Sedimentary uplands.** Land areas of bedrock formed from water- or wind-deposited sediments.

They are higher on the landscape than the flood plain.

**Seepage (in tables).** The movement of water through soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shelterwood system.** A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

**Shoulder.** The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell (in tables).** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine

sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Similarity index.** A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

**Slickens.** Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip

surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slickspot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level .....	0 to 2 percent
Gently sloping .....	2 to 4 percent
Moderately sloping .....	4 to 8 percent
Strongly sloping .....	8 to 15 percent
Moderately steep .....	15 to 25 percent
Steep .....	25 to 45 percent
Very steep .....	more than 45 percent

**Slope (in tables).** Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slow 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:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

**Stony soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Strath terrace.** A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

**Strippcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It

commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Tailwater.** The water directly downstream of a structure.

**Talus.** Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

**Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace (geologic).** An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Terracette.** Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

**Thin layer (in tables).** A layer of otherwise suitable soil material that is too thin for the specified use.

**Till plain.** An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

**Too arid (in tables).** The soil is dry most of the time, and vegetation is difficult to establish.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Tread.** The relatively flat terrace surface that was cut or built by stream or wave action.

**Tuff.** A compacted deposit that is 50 percent or more volcanic ash and dust.

**Understory.** Any plants in a forest community that grow to a height of less than 5 feet.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley.** An elongated depressional area primarily developed by stream action.

**Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

**Variation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The action of uprooting and tipping over trees by the wind.

# Accessibility Statement

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