United States Department of Agriculture

In cooperation with the Montana Agricultural Experiment Station

Natural Resources Conservation Service

Soil Survey of Big Hole Area–Part of Beaverhead County, Montana

The original maps and tables have been deleted from this online version. Since publication of the soil survey, 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

The detailed soil maps can be useful in planning the use and management of small areas. You can access the detailed soil maps at the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

Go to the web site and follow the instructions to access the maps. Once the area of interest (AOI) has been selected, the “Soil Map” tab will provide a view of the detailed soil map and a legend that is hyperlinked to map unit descriptions. Click on the “Soil Data Explorer” tab to access the interpretations and reports. Report categories and subcategories include Suitabilities and Limitations for Use, Soil Properties and Qualities, and Soil Reports. Intrepretive data can also be accessed at the Soil Data Mart (http://soildatamart.nrcs.usda.gov/).

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

National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Beaverhead County Conservation District.

Major fieldwork for this soil survey was completed in 2004. Soil names and descriptions were approved in 2005. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2004. The most current official data are available at http://websoilsurvey.nrcs.usda.gov/app/.

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

Nondiscrimination Statement

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Cover: Soils in the foreground are a complex of Foxgulch, Mooseflat, and Copperbasin. Soils in the middle ground are Beaverslide, Wisdom, and Shewag. This area is known as the Big Hole Valley. The Beaverhead Mountains are in the background. The old-time "beaverslides," traditionally used to stack hay, are in the foreground.

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

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Foreword

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

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

Dave White
State Conservationist
Natural Resources Conservation Service

Soil Survey of Big Hole Area—Part of Beaverhead County, Montana

By Gary F. Berger, Project Leader

Fieldwork by Gary F. Berger, Patrick E. McCain, Kenneth T. Scalzone, Calvin Sibley, and Eve Wills, Natural Resources Conservation Service

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

Big Hole Area—Part of Beaverhead County is located in south-central Montana (fig. 1). The survey area includes 315,000 acres, or about 492 square miles. Dillon, the county seat, is located in the east-central part of the county. Other Beaverhead County soil survey areas include the Beaverhead National Forest Area, Dillon Area—Part of Beaverhead County, Horse Prairie—South Valley Area, and Red Rock Lakes Area.

General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history and development, geology, stream morphology, ground-water resources, mining, oil and gas, seismicity, and climate.

History and Development

Michael Garverich, Montana State Geologist, Natural Resources Conservation Service, prepared this section.

The first recorded travel through the Big Hole area occurred when part of the Lewis and Clark Expedition traveled through the valley from north to south. They were following an old trail used by Native Americans in the distant past. The Clark portion of the expedition traveled from the Bitterroot Valley over what now is known as Gibbon's Pass and down Trail Creek to enter the Big Hole Valley near the present site of the Big Hole National Battlefield. The party traveled south up most of the length of the valley and exited over Big Hole Pass on their way to recover canoes and supplies cached near the present Clark Canyon Dam. With their exit, the Big Hole reverted to seasonal occupancy and travel by Native Americans. Lewis and Clark had earlier named the stream draining the Big Hole as the Wisdom River but the name was later changed to reflect the nature of the valley it drained, the Big Hole, the largest intermountain valley ("hole" of the fur trade parlance) of the region. The name Wisdom remains as the name of the largest town in the valley.

After the Lewis and Clark Expedition, the Big Hole likely remained the seasonal haunt of various Indian tribes and part of a north-south trail used by a few fur trappers traveling between the Flathead Region and the Fur Trade Rendezvous of the Green

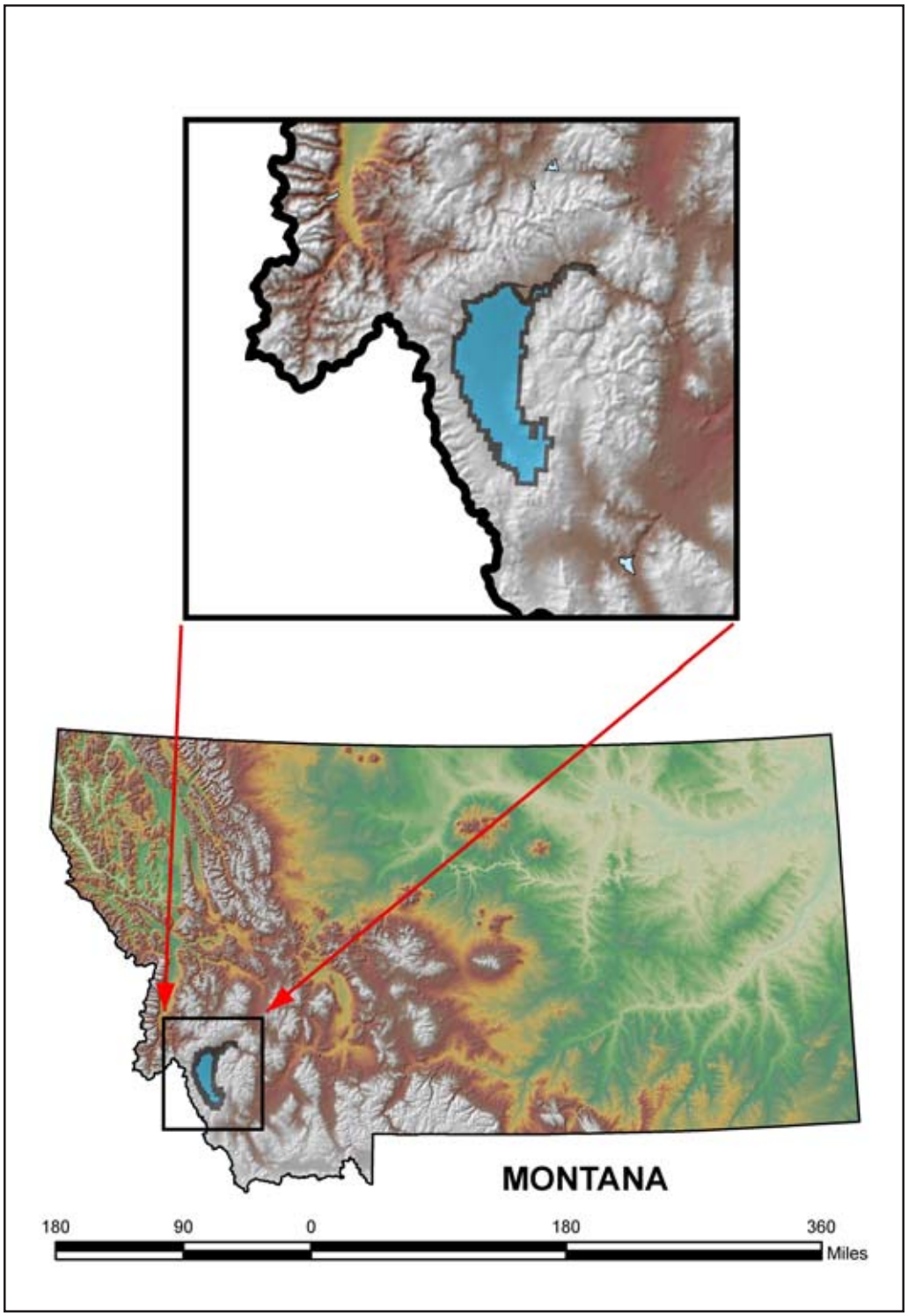

Figure 1.—Location of Big Hole Area—Part of Beaverhead County, Montana

River-Bear River area. The winter season in the valley was likely too severe for any wintertime occupancy.

The discovery of gold at Bannack in 1864, near the southeast limit of this soil survey, led to an influx of settlers into the area. Prospectors and miners arrived first, but business and professional people common to gold rush camps of that era closely

followed. Agricultural businesses soon followed the prospectors into the area and occupied the more temperate valleys to the south and east. At this time, the Big Hole area was likely first used for summer range with livestock driven to winter pastures in areas of less snowfall. The demand for arable land soon brought full-time residents to the Big Hole Valley and led to the establishment of the towns of Wisdom to the north and Jackson to the south in the early 1880s.

In August of 1877, some of the Nez Perce Indians of Idaho attempted to travel to Canada. They were treated as hostiles by the U.S. Army and many local residents. Their journey brought them into the Big Hole Valley where they camped at the northwest edge. The U.S. Army surprised the camp in the early morning and the ensuing battle is commemorated at the Big Hole National Battlefield located about 9.6 miles west of Wisdom. After the battle, the Nez Perce traveled south through the valley and on south and east.

Year-round agricultural activities soon brought recognition to the valley for its production of high-quality grass hay. The production of hay and the extreme climate due to the elevation, about 6,000 feet, eventually led to the invention of the signature mechanical device of the valley, the "beaverslide," (fig. 2) used in stacking loose grass hay in weather-resistant stacks in the most efficient manner with limited power technology. First constructed from the native lodgepole pine and later from steel pipe, their use spread to other mountain valleys with readily available supplies of lodgepole pines. These devices are still scattered about the valley, largely replaced by modern technology, but still standing as monuments to the ingenuity of farmers and ranchers.

Consolidation of agriculture-land ownership has reduced the population of the valley in recent years, so that Wisdom and Jackson have lost many businesses and have limited services available today. This loss has been offset in part by improvements in the local highway system that allow valley residents to travel to Dillon and other locations with relative ease in nearly all types of weather.

Figure 2.—Patented in 1909, the "Sunny Slope Slide Stacker," commonly known as the "beaverslide," remained popular until the 1990s, when it was largely displaced by mechanized equipment for producing large round bales of hay.

Although the number of farms and ranches has declined, agriculture remains the major economic force in the valley. Additional economic benefits are created by tourism, including hunting, fishing, snowmobiling, and Nordic skiing.

Geology

Michael Garverich, Montana State Geologist, Natural Resources Conservation Service, prepared this section.

Sedimentary rocks of the Big Hole Valley record only two periods of the earth's history—Middle Proterozoic (Belt Supergroup rocks) and Tertiary (Bozeman Group rocks) to Recent. Northwest of the basin, Tertiary plutonic rocks (granodiorite) are found. Along the east side of the valley, Cretaceous biotite granodiorite and Tertiary and Cretaceous biotite-muscovite granite are found. The basin's position within the North American Craton suggests that there were other rock units present at the surface at some time. Igneous activity and/or east-directed thrusting during Cretaceous time has either buried Paleozoic and Mesozoic sedimentary rocks or pushed them eastward. The southwestern side of the valley contains extensive deposits of till deposited by alpine-type glaciers that flowed out of the Beaverhead Mountains to the southwest. Major portions of the valley floor are covered by Quaternary alluvium.

The Big Hole Valley is a fault-controlled, intermountain basin. The eastside boundary fault is a very steep fault, downthrown on the west. This fault is likely a listric fault that flattens out into one of the preexisting thrusts that are ubiquitous in southwestern and western Montana. The western boundary faults are steep normal faults downthrown on the east and are likely antithetic faults relative to the eastern boundary fault. The floor of the basin is nearly flat with some east-west cross faults breaking up the basin into smaller sub-basins. The Big Hole Valley is likely the largest and deepest basin in Montana. An oil-exploration test well penetrated 16,048 feet, mostly in Tertiary basin fills, and terminated in Belt Supergroup rocks.

There is about 15,910 feet of Tertiary sediments (mostly sands, gravels, silts, and clays and their cemented equivalents) in the deepest part of the basin, northwest of Wisdom. These Tertiary sediments are underlain by rocks of the Belt Supergroup (quartzites, siltites, and limestones), the "basement" of the basin. Belt rocks also outcrop in the surrounding mountains. Southwest of Jackson, the basin has about 8,388 feet of Tertiary sediments overlying about 953 feet of Lowland Creek Volcanics (lava and volcanic ash and related rocks) overlying rocks of the Belt Supergroup. The central part of the basin is largely filled with finer-grained sediments, and the edges near the boundary faults having coarser-grained sediments.

The first part of earth's history recorded in the rocks of the Big Hole area is recorded in Belt Supergroup rocks. These rocks are found in the mountains to the east and west of the valley and below the Tertiary sediments. Although these rocks are presently located adjacent and beneath the valley, they originated some distance to the west and at considerable depth. These rocks were transported to their present position as part of one or more thrust-sheets pushed eastward from what is now Idaho. The thrusting took place in late Cretaceous to early Tertiary time. Near the end of the compressional forces that generated the thrusting, large amounts of magma were emplaced at depth where they slowly cooled, producing the plutonic (granite-like) rocks found adjacent to the basin, in the Pioneer Mountains to the east, and in the Anaconda Range to the northwest.

Belt Supergroup rocks are Middle Proterozoic in age, deposited about 1.2-0.8 billion years before the present. These rocks have been lightly metamorphosed by burial and are mostly quartzites, siltites, and argillites. There is little fossil material in these rocks, as life forms were limited to algae. These rocks were deposited in a basin located some distance to the west and have been transported to their present location as

parts of large thrust-sheets. Minimum distance of movement is thought to be at least 60 kilometers but may be significantly larger. These rocks were deeply buried, folded, and extensively eroded before middle Cambrian time of the early Paleozoic Era.

Paleozoic and Mesozoic sedimentary rocks are not exposed within the Big Hole Basin and vicinity. Small outcrops are present along the Big Hole River near Fishtrap Creek and are more extensive near Wise River. The Big Hole area is within the zone of eastward-directed thrusts that was initiated during Cretaceous time and likely continued into earliest Tertiary time. The thrusts were pushed eastward, and, in many places, they have overridden sediments and other rocks that were already in place. During the late stages of thrusting or shortly after, large volumes of magma was emplaced in the mountains to the east and northwest. These rocks cooled at a significant depth as indicated by their grain size.

The Big Hole Basin likely first formed as a shallow basin in an area of low relief in middle to late Eocene time when Renova Formation-equivalent rocks (fine grained with a large volcanoclastic component) were deposited. Renova deposition was terminated by a long period of faulting and erosion. The basins of western Montana and adjacent areas were raised and tilted. At this time, there was likely a well-developed drainage system of streams capable of moving significant volumes of sediment away from western Montana as the Renova sediments were tilted and large volumes removed by erosion.

The period of erosion was terminated by renewed development and subsidence of basins, and the Sixmile Creek Formation (coarse clastics and tuffaceous siltstones) was deposited in the reformed and newly formed basins. During Sixmile Creek deposition, the local relief was likely greater than during Renova time and external drainage was likely poor to nonexistent. At the end of Sixmile Creek deposition, the basins were likely choked with sediments and basin floors elevated enough to develop an external drainage system.

At the end of Sixmile Creek time, southwestern Montana came under the influence of the passing Yellowstone Hotspot. This event likely elevated areas to the south and forced the development of the present drainage system. Streams established on easily eroded Tertiary sediments of the Sixmile Creek and Renova Formations have eroded downward into resistant rocks under the basin fills, resulting in the formation of canyons, such as Maiden Rock on the Big Hole River and Jefferson Canyon on the Jefferson River. The Big Hole Basin, like most of the basins in southwestern Montana, drains to the north and east.

During the last 1- to 2-million years or so, there has been a large influx of mostly coarse sediments from glacial activity centered in the mountain ranges located to the west. This deposit of mostly coarse clastics (gravels and sands) extends from the southern end of the valley to its northern end, but the deposit is less well developed in the west-central area. This deposit is estimated from limited well log data to be about 200 feet thick, but the deposit is wedge shaped, tapering to the east. This wedge of coarse clastic material has displaced the river to the east of the valley center. These gravels and sands now serve as an aquifer and provide a large sink for surface waters that flow across them in the upper reaches of the valley and along the west side of the valley. Seepage from streams, canals, and irrigated fields recharge this aquifer. In the lower reaches of the valley, the coarse sediments discharge back into the river to provide later season flows.

Stream Morphology

Simplistically, the shape of a stream channel is determined by gradient, flow rate, and amount of sediment carried. Changes in one of these factors can change the plan view of a stream. If a stream is in a near equilibrium between sediment load and stream flow, it will have a meandering morphology, such as the upper reaches of the

Big Hole River. An examination of maps of the Big Hole Valley shows that the Big Hole River changes from a dominantly meandering stream to a braided stream with multiple channels and islands near the southern half of section 20, T. 4 S., R. 15 W. This change in stream morphology (shape) is caused by an increase in sediment load relative to the carrying capacity of the stream, which causes deposition of sediments and formation of bars and islands. This change can be attributed to three possible causes: loss of flow volume, influx of sediment load, or a decrease in stream gradient. Of these three factors, an increase in sediment load does not seem likely due to the generally well-vegetated nature of the area. There may be a subtle change in stream gradient in this vicinity but it is not readily apparent. It is likely that a loss of flow volume due to water seeping into the sand and gravel of the streambed (a losing reach) is causing the stream to become braided in this vicinity. Near Wisdom, the channel reverts to a dominantly meandering morphology, indicating that the stream has returned to equilibrium between flow volume, sediment load, and grade. This change is likely due to an increase in flow volume caused by water discharging from the sediments into the stream (gaining reach).

Ground-water Resources

The flood plains of streams within the Big Hole Valley are underlain by alluvium. This geological unit is generally a good aquifer, but it may be subject to pollution in some areas. Sand and gravel units within the Sixmile Formation will likely yield adequate volumes and quality of water for domestic and livestock purposes. The Renova Formation is generally not an aquifer. Belt Supergroup rocks and igneous rocks require fractures to provide permeability and porosity, so well capacity will depend on the number and orientation of fractures intersected by the well bore.

Mining

Metallic Minerals

Small amounts of base and precious metals have been produced from mining districts in the mountains to the east, south, and west of the Big Hole Valley. Production includes placer gold as well as base and precious metals from hard-rock mines. No one mine has produced more than a few thousand tons of ore. The rocks of the Belt Supergroup that surround the valley are generally not well suited to the formation of large ore deposits, so the region is not likely to become the focus of metallic minerals exploration and production.

Nonmetallic Minerals

The deposits of alluvium found along the stream valleys provide adequate volumes and quality of aggregate for local construction activities. Due to the remote location of the valley, it is not likely to be economically feasible to transport aggregate to surrounding areas.

Volcanic-tuff beds of the Sixmile Creek Formation and equivalents have been found to contain significant amounts of zeolites in nearby basins. There is a possibility that zeolites can be found in the Big Hole Basin, but the remoteness and poor transportation facilities will likely make other basins a more attractive exploration/production target.

Deposits of other nonmetallic minerals are not known at this time.

Oil and Gas

The Big Hole Basin is likely to be the deepest Tertiary basin in Montana. As noted above, an oil-and-gas exploration hole drilled through 15,910 feet of Tertiary sediments. Numerous indications of hydrocarbons and other organic material were encountered, although no commercial quantities were indicated by testing. The size of the basin suggests that the two holes completed to date are not an adequate effort to test the organic-fuels potential of the basin. The basin likely remains a viable exploration target for oil and gas.

Seisicity

The general vicinity of southwestern Montana is a seismically active area with numerous historic nearby earthquakes, including, to the west, the Bora Peak earthquake and the recent quake in the Beaverhead Valley. Although there appears to be a lack of recent fault scarps in the Big Hole Valley, recent seismic activity in the surrounding valleys suggest that this area could be subject to significant earthquake activity without warning.

Climate

This section was prepared by the Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon.

The climate tables were created from climate station Wisdom.

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from the First Order station at Idaho Falls, Idaho.

The "Temperature and Precipitation" table gives data on temperature and precipitation for the survey area as recorded at Wisdom in the period 1971 to 2000. The "Freeze Dates in Spring and Fall" table shows probable dates of the last freeze in spring and the first freeze in fall. The "Growing Season" table provides data on the length of the growing season.

In summer, the average temperature is 55.3 degrees F at Wisdom. The average daily maximum summer temperature is 74.8 degrees F. The highest temperature ever recorded at Wisdom was 96 degrees F on August 2, 1949.

In winter, the average temperature is 15.8 degrees F at Wisdom. The average daily minimum winter temperature is 2.7 degrees F. The lowest temperature ever recorded at Wisdom was -55 degrees F on December 23, 1983.

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

The average annual precipitation in the soil survey area is about 11.89 inches. Of this amount, about 1.28 inches, or 11 percent, usually falls during July. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record at Wisdom was 1.70 inches on September 8, 1970 and July 10, 1983. Thunderstorms occur on about 25 days each year, mostly during July.

The average seasonal snowfall is 34.1 inches. The greatest snow depth at any one time during the period of record at Wisdom was 24 inches recorded on March 2, 1989. On average, about 37 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 16.0 inches, recorded on March 13, 1939.

The average relative humidity in midafternoon is about 51 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 65 percent of the time in summer and 35 percent in winter. The prevailing wind is from the south-southwest. Average wind speed is highest, 9.4 miles per hour, in April.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs, used in combination with digital orthophotographic imagery (black and white, color, and color infrared), show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

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

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

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

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given 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, Hairpin silt loam, 2 to 8 percent slopes, is a phase of the Hairpin 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. Libeg, stony-Monad complex, 4 to 15 percent slopes is an example.

This survey includes miscellaneous areas. They have little or no soil material and support little or no vegetation. Gravel pit is an example.

The "Acreage and Proportionate Extent of the Soils" table gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the "Glossary."

3D—Libeg, stony-Monad complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,500 to 8,150 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Libeg, stony and similar soils
Composition: 45 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,500 to 8,150 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 5 inches; gravelly loam
A2—5 to 10 inches; gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Monad and similar soils
Composition: 35 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,500 to 8,150 feet

Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
A—0 to 15 inches; loam
Bt/E—15 to 20 inches; loam
Bt1—20 to 29 inches; gravelly clay loam
Bt2—29 to 60 inches; gravelly clay loam

Additional Components

Adel and similar soils: 5 percent
Butchhill, extremely stony and similar soils: 5 percent
Libeg, extremely stony, greater slopes and similar soils: 5 percent
Sebud and similar soils: 5 percent

4E—Butchhill gravelly loam, stony, 15 to 45 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,500 to 8,200 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Butchhill, stony and similar soils
Composition: 80 percent
Geomorphic description: Hillslope
Slope: 15 to 45 percent
Elevation: 6,500 to 8,200 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey colluvium derived from metamorphic and sedimentary rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches
Typical profile:
A—0 to 12 inches; gravelly loam
E/Bt—12 to 19 inches; very gravelly loam
Bt1—19 to 30 inches; very cobbly clay
Bt2—30 to 60 inches; very cobbly clay loam

Additional Components

Adel and similar soils: 4 percent
Butchhill, extremely stony, greater slopes and similar soils: 4 percent
Hairpin and similar soils: 4 percent
Libeg and similar soils: 4 percent
Nieman, extremely stony and similar soils: 3 percent
Rock outcrop: 1 percent

5C—Hairpin silt loam, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,500 to 8,250 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Hairpin and similar soils
Composition: 80 percent
Geomorphic description: Fan remnant; lake terrace
Slope: 2 to 8 percent
Elevation: 6,500 to 8,250 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Lacustrine deposits and/or clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A1—0 to 4 inches; silt loam
A2—4 to 12 inches; cobbly silt loam
Bt/E—12 to 22 inches; clay loam
2Btss1—22 to 42 inches; clay
2Btss2—42 to 60 inches; gravelly clay

Additional Components

Monad and similar soils: 7 percent
Libeg and similar soils: 6 percent
Adel and similar soils: 5 percent
Finn and similar soils: 2 percent

6D—Hairpin-Libeg, stony-Monad, stony complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 8,100 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Hairpin and similar soils
Composition: 55 percent
Geomorphic description: Hillslope; slump
Slope: 4 to 15 percent
Elevation: 6,200 to 8,100 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Lacustrine deposits and/or clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A1—0 to 4 inches; silt loam
A2—4 to 12 inches; cobbly silt loam
Bt/E—12 to 22 inches; clay loam
2Btss1—22 to 42 inches; clay
2Btss2—42 to 60 inches; gravelly clay

Libeg, stony and similar soils
Composition: 20 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,200 to 8,100 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 5 inches; gravelly loam
A2—5 to 10 inches; gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Monad, stony and similar soils
Composition: 15 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,200 to 8,100 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
A—0 to 15 inches; loam
Bt/E—15 to 20 inches; loam
Bt1—20 to 29 inches; gravelly clay loam
Bt2—29 to 60 inches; gravelly clay loam

Additional Components

Finn and similar soils: 5 percent
Hooligan and similar soils: 5 percent

7E—Hairpin-Butchhill complex, 15 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,500 to 8,100 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Hairpin and similar soils
Composition: 50 percent
Geomorphic description: Hillslope
Slope: 15 to 35 percent
Elevation: 6,500 to 8,100 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Lacustrine deposits and/or clayey colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A1—0 to 4 inches; silt loam
A2—4 to 12 inches; cobbly silt loam
Bt/E—12 to 22 inches; clay loam

2Btss1—22 to 42 inches; clay
2Btss2—42 to 60 inches; gravelly clay

Butchhill and similar soils
Composition: 35 percent
Geomorphic description: Hillslope
Slope: 15 to 35 percent
Elevation: 6,500 to 8,100 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey alluvium and/or colluvium derived from metamorphic and sedimentary rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches
Typical profile:
A—0 to 12 inches; gravelly loam
E/Bt—12 to 19 inches; very gravelly loam
Bt1—19 to 30 inches; very cobbly clay
Bt2—30 to 60 inches; very cobbly clay loam

Additional Components

Butchhill, stony and similar soils: 5 percent
Hooligan and similar soils: 5 percent
Adel and similar soils: 4 percent
Finn and similar soils: 1 percent

8E—Libeg-Tiban, stony complex, 8 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 7,100 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 45 percent
Geomorphic description: Riser on escarpment
Slope: 8 to 35 percent
Elevation: 6,100 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None

Available water capacity: Mainly 5.2 inches
Typical profile:
A1—0 to 5 inches; very gravelly loam
A2—5 to 10 inches; very gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Tiban, stony and similar soils
Composition: 35 percent
Geomorphic description: Riser on escarpment
Slope: 8 to 35 percent
Elevation: 6,100 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.8 inches
Typical profile:
A1—0 to 3 inches; very cobbly loam
A2—3 to 7 inches; very gravelly loam
Bw1—7 to 17 inches; very gravelly loam
Bw2—17 to 24 inches; very gravelly loam
Bk—24 to 60 inches; extremely gravelly loam

Additional Components

Monaberg and similar soils: 10 percent
Maurice, very stony and similar soils: 5 percent
Sebud and similar soils: 5 percent

9B—Bearmouth-Mooseflat-Finn complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,600 to 7,510 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Bearmouth and similar soils
Composition: 30 percent
Geomorphic description: Stream terrace
Slope: 0 to 4 percent
Elevation: 6,600 to 7,510 feet
Effective annual precipitation: 18 to 24 inches

Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 5 inches; gravelly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Mooseflat and similar soils
Composition: 30 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 6,600 to 7,510 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Finn and similar soils
Composition: 20 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 6,600 to 7,510 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A1—3 to 7 inches; silt loam
A2—7 to 15 inches; silt loam

Bw1—15 to 27 inches; very cobbly loam
2Bw2—27 to 35 inches; extremely gravelly sandy loam
2Cg—35 to 60 inches; extremely cobbly loamy sand

Additional Components

Tepete and similar soils: 12 percent
Bearmouth, stony and similar soils: 6 percent
Water: 2 percent

10B—Bearmouth very gravelly loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,690 to 7,450 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Bearmouth and similar soils
Composition: 80 percent
Geomorphic description: Fan remnant; stream terrace
Slope: 0 to 4 percent
Elevation: 6,690 to 7,450 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.1 inches
Typical profile:
A—0 to 5 inches; very gravelly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Additional Components

Wisdom and similar soils: 10 percent
Bearmouth, stony and similar soils: 5 percent
Shewag and similar soils: 5 percent

12E—Hairpin-Libeg, very stony complex, 4 to 45 percent slopes, slumped

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,600 to 8,050 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Hairpin and similar soils
Composition: 50 percent
Geomorphic description: Hillslope; slump
Slope: 4 to 25 percent
Elevation: 6,600 to 8,050 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey lacustrine deposits and/or alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A1—0 to 4 inches; silt loam
A2—4 to 12 inches; cobbly silt loam
Bt/E—12 to 22 inches; clay loam
2Btss1—22 to 42 inches; clay
2Btss2—42 to 60 inches; gravelly clay

Libeg, very stony and similar soils
Composition: 25 percent
Geomorphic description: Hillslope; slump
Slope: 8 to 45 percent
Elevation: 6,600 to 8,050 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.10 to 3.00 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches
Typical profile:
A1—0 to 5 inches; very cobbly loam
A2—5 to 10 inches; very cobbly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Additional Components

Finn and similar soils: 10 percent
Butchhill, very stony and similar soils: 7 percent
Nieman and similar soils: 5 percent
Water: 2 percent
Rock outcrop: 1 percent

12E—Hairpin-Libeg, very stony complex, 4 to 45 percent slopes, slumped

Map Unit Setting

Field investigation intensity: Order 2
Landscape: mountains
Elevation: 6,600 to 8,050
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Hairpin and similar soils
Composition: 50 percent
Geomorphic description: Hillslope; slump
Slope: 4 to 25 percent
Elevation: 6,600 to 8,050 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey lacustrine deposits and/or alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A1—0 to 4 inches; silt loam
A2—4 to 12 inches; cobbly silt loam
Bt/E—12 to 22 inches; clay loam
2Btss1—22 to 42 inches; clay
2Btss2—42 to 60 inches; gravelly clay

Libeg, very stony and similar soils
Composition: 25 percent
Geomorphic description: Hillslope; slump
Slope: 8 to 45 percent
Elevation: 6,600 to 8,050 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.10 to 3.00 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches
Typical profile:
A1—0 to 5 inches; very cobbly loam
A2—5 to 10 inches; very cobbly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Additional Components

Finn and similar soils: 10 percent
Butchhill, very stony and similar soils: 7 percent
Nieman and similar soils: 5 percent
Water: 2 percent
Rock outcrop: 1 percent

13B—Foxgulch-Mooseflat-Copperbasin complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,940 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Foxgulch and similar soils
Composition: 45 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 5,900 to 6,940 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 7.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 11 inches; silt loam
A2—11 to 16 inches; silty clay loam
Bw—16 to 29 inches; silt loam
BC—29 to 36 inches; sandy clay loam
2C—36 to 60 inches; very gravelly sand

Mooseflat and similar soils
Composition: 25 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,940 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium

Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.6 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; silty clay loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Copperbasin and similar soils
Composition: 15 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 5,900 to 6,940 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.8 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 7 inches; very cobbly loam
AC—7 to 16 inches; extremely cobbly loamy sand
C1—16 to 35 inches; extremely cobbly sand
C2—35 to 60 inches; extremely cobbly sand

Additional Components

Water: 5 percent
Wisdom and similar soils: 5 percent
Redfish and similar soils: 3 percent
Tepete and similar soils: 2 percent

15A—Foxgulch-Copperbasin-Wisdom complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,900 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Foxgulch and similar soils
Composition: 40 percent

Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,900 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 7.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 11 inches; silt loam
A2—11 to 16 inches; silty clay loam
Bw—16 to 29 inches; silt loam
BC—29 to 36 inches; sandy clay loam
2C—36 to 60 inches; very gravelly sand

Copperbasin and similar soils
Composition: 25 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,900 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.8 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 7 inches; very cobbly loam
AC—7 to 16 inches; extremely cobbly loamy sand
C1—16 to 35 inches; extremely cobbly sand
C2—35 to 60 inches; extremely cobbly sand

Wisdom and similar soils
Composition: 20 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 2 percent
Elevation: 5,900 to 6,900 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 14 inches; silt loam
Bw—14 to 27 inches; loam
2C—27 to 60 inches; extremely gravelly sand

Additional Components

Mooseflat and similar soils: 5 percent
Tepete and similar soils: 5 percent
Shewag and similar soils: 3 percent
Water: 2 percent

16A—Tepete-Dunkleber-Mooseflat complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 7,040 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Tepete and similar soils
Composition: 55 percent
Geomorphic description: Marsh
Slope: 0 to 2 percent
Elevation: 6,000 to 7,040 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Mucky peat organic material
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Ponding duration: Very long
Available water capacity: Mainly 16.9 inches
Typical profile:
OE—0 to 40 inches; moderately decomposed plant material
Ag—40 to 50 inches; silt loam
2Cg—50 to 60 inches; very gravelly sandy clay loam

Dunkleber and similar soils
Composition: 25 percent
Geomorphic description: Marsh
Slope: 0 to 2 percent

Elevation: 6,000 to 7,040 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Mucky peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Mucky peat organic material
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Ponding duration: Long
Available water capacity: Mainly 20.7 inches
Typical profile:
Oi1—0 to 18 inches; mucky peat
Oi2—18 to 60 inches; mucky peat

Mooseflat and similar soils
Composition: 15 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 6,000 to 7,040 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Additional Components

Water: 3 percent
Slagamelt and similar soils: 2 percent

19E—Hooligan-Inabnit complex, 8 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 7,050 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Hooligan and similar soils
Composition: 50 percent
Geomorphic description: Hillslope
Slope: 8 to 25 percent
Elevation: 6,200 to 7,050 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Fine-loamy alluvium over residuum weathered from siltstone
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.3 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 10 inches; loam
Bt1—10 to 26 inches; gravelly clay loam
Bt2—26 to 35 inches; clay loam
Cr—35 to 60 inches; weathered bedrock

Inabnit, stony and similar soils
Composition: 30 percent
Geomorphic description: Hillslope
Slope: 8 to 35 percent
Elevation: 6,200 to 7,050 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: Paralithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from siltstone
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches
Typical profile:
A—0 to 3 inches; very cobbly loam
Bt—3 to 15 inches; very paragravelly silty clay loam
Cr—15 to 60 inches; weathered bedrock

Additional Components

Nieman, very stony and similar soils: 7 percent
Ratiopeak and similar soils: 6 percent
Hooligan, lesser slopes and similar soils: 5 percent
Rock outcrop: 2 percent

21E—Nieman, extremely stony-Sebud, very stony complex, 15 to 45 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,500 to 8,200 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Nieman, extremely stony and similar soils
Composition: 55 percent
Geomorphic description: Hillslope
Slope: 15 to 45 percent
Elevation: 6,500 to 8,200 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 3 to 15 percent stones
Depth to restrictive feature: Lithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.4 inches
Typical profile:
A—0 to 5 inches; very cobbly loam
Bt—5 to 12 inches; extremely cobbly sandy clay loam
C—12 to 16 inches; extremely cobbly sandy clay loam
R—16 to 60 inches; unweathered bedrock

Sebud, very stony and similar soils
Composition: 25 percent
Geomorphic description: Hillslope
Slope: 15 to 45 percent
Elevation: 6,500 to 8,200 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.10 to 3.00 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Gravelly alluvium and/or colluvium derived from igneous and metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.5 inches
Typical profile:
A—0 to 11 inches; gravelly loam
Bw1—11 to 22 inches; very gravelly loam
Bw2—22 to 37 inches; very gravelly loam
C—37 to 60 inches; extremely gravelly sandy loam

Additional Components

Rock outcrop: 10 percent
Nieman, lesser slopes, extremely stony and similar soils: 5 percent
Rubble land: 5 percent

22B—Bighole silt loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,600 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Bighole and similar soils
Composition: 80 percent
Geomorphic description: Stream terrace
Slope: 0 to 4 percent
Elevation: 6,100 to 6,600 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 8 inches; silt loam
A2—8 to 17 inches; silt loam
Bt/E—17 to 26 inches; silt loam
Bt—26 to 41 inches; clay loam
Bk—41 to 60 inches; silt loam

Additional Components

Lehunt and similar soils: 7 percent
Beaverslide and similar soils: 4 percent
Cowcamp and similar soils: 2 percent
Lehunt, saline and similar soils: 2 percent
Shewag and similar soils: 2 percent
Tepete and similar soils: 2 percent
Water: 1 percent

23B—Wisdom-Shewag-Mooseflat complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 7,080 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Wisdom and similar soils
Composition: 40 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,900 to 7,080 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 14 inches; silt loam
Bw—14 to 27 inches; loam
2C—27 to 60 inches; extremely gravelly sand

Shewag and similar soils
Composition: 30 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,900 to 7,080 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 9 inches; very gravelly loam
Bw—9 to 18 inches; extremely gravelly sandy loam
2C—18 to 60 inches; extremely gravelly sand

Mooseflat and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 2 percent
Elevation: 5,900 to 7,080 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Additional Components

Tepete and similar soils: 5 percent
Bighole and similar soils: 3 percent
Cowcamp and similar soils: 2 percent

24B—Beaverslide silt loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 6,800 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Beaverslide and similar soils
Composition: 80 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 6,200 to 6,800 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Calcareous clayey outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 12 inches; silt loam
E/Bt—12 to 15 inches; silt loam
Bt—15 to 21 inches; clay
Btk—21 to 37 inches; silty clay loam
Bk—37 to 60 inches; clay loam

Additional Components

Cowcamp and similar soils: 8 percent
Bighole and similar soils: 5 percent
Wisdom and similar soils: 4 percent
Cowcamp, greater slopes and similar soils: 3 percent

27C—Bearmouth, stony-Bearmouth complex, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,500 to 7,400 feet
Mean annual precipitation: 16 to 22 inches
Frost-free period: 30 to 50 days

Component Description

Bearmouth, stony and similar soils
Composition: 55 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,500 to 7,400 feet
Effective annual precipitation: 16 to 22 inches
Frost-free period: 30 to 50 days
Surface layer texture: Cobbly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 5 inches; cobbly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Bearmouth and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,500 to 7,400 feet
Effective annual precipitation: 16 to 22 inches

Frost-free period: 30 to 50 days
Surface layer texture: Very stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.1 inches
Typical profile:
A—0 to 5 inches; very stony loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Additional Components

Adel and similar soils: 10 percent
Bata, very stony and similar soils: 5 percent
Bearmouth, very cobbly and similar soils: 5 percent

29A—Donald silt loam, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,600 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Donald and similar soils
Composition: 85 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,100 to 6,600 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.7 inches
Typical profile:
A1—0 to 11 inches; silt loam
A2—11 to 15 inches; silt loam
E/Bt—15 to 20 inches; clay loam
Bt—20 to 30 inches; clay
Btk—30 to 38 inches; gravelly clay loam
Bk—38 to 60 inches; very gravelly clay loam

Additional Components

Mussigbrod and similar soils: 10 percent
Philipsburg and similar soils: 3 percent
Ratiopeak and similar soils: 2 percent

29C—Donald loam, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 7,000 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Donald and similar soils
Composition: 85 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,200 to 7,000 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches
Typical profile:
A1—0 to 11 inches; loam
A2—11 to 15 inches; loam
E/Bt—15 to 20 inches; clay loam
Bt—20 to 30 inches; clay
Btk—30 to 38 inches; gravelly clay loam
Bk—38 to 60 inches; very gravelly clay loam

Additional Components

Butchhill, stony and similar soils: 5 percent
Libeg, stony and similar soils: 5 percent
Monad and similar soils: 5 percent

30D—Donald loam, 8 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 7,000 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Donald and similar soils
Composition: 85 percent
Geomorphic description: Hillslope
Slope: 8 to 15 percent
Elevation: 6,200 to 7,000 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches
Typical profile:
A1—0 to 11 inches; loam
A2—11 to 15 inches; loam
E/Bt—15 to 20 inches; clay loam
Bt—20 to 30 inches; clay
Btk—30 to 38 inches; gravelly clay loam
Bk—38 to 60 inches; very gravelly clay loam

Additional Components

Butchhill, stony and similar soils: 5 percent
Libeg, stony and similar soils: 5 percent
Monad and similar soils: 5 percent

31F—Sebud very cobbly loam, very stony, 15 to 60 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,800 to 8,000 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Sebud, very stony and similar soils
Composition: 85 percent
Geomorphic description: Mountain slope
Slope: 15 to 60 percent
Elevation: 6,800 to 8,000 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.10 to 3.00 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Gravelly alluvium and/or colluvium derived from igneous and metamorphic rock

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A—0 to 11 inches; very cobbly loam
Bw1—11 to 22 inches; very gravelly loam
Bw2—22 to 37 inches; very gravelly loam
C—37 to 60 inches; extremely gravelly sandy loam

Additional Components

Nieman and similar soils: 5 percent
Rock outcrop: 5 percent
Rubble land: 5 percent

32C—Philipsburg silt loam, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 7,000 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Philipsburg and similar soils
Composition: 90 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,100 to 7,000 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.4 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 14 inches; silt loam
Bt1—14 to 20 inches; silty clay loam
Bt2—20 to 32 inches; clay loam
Bk1—32 to 43 inches; gravelly loam
Bk2—43 to 60 inches; very gravelly sandy loam

Additional Components

Monad and similar soils: 5 percent
Libeg, stony and similar soils: 3 percent
Mooseflat and similar soils: 2 percent

33A—Proposal silt loam, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Proposal and similar soils
Composition: 95 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.3 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 16 inches; silt loam
Bw—16 to 45 inches; silt loam
Bk—45 to 60 inches; loam

Additional Components

Bighole and similar soils: 5 percent

34A—Cowcamp-Proposal complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Cowcamp and similar soils
Composition: 65 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted

Drainage class: Well drained
Parent material: Loamy skeletal alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.2 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; silt loam
A2—6 to 13 inches; silt loam
Bt/E—13 to 18 inches; gravelly silt loam
Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Proposal and similar soils
Composition: 30 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.3 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 16 inches; silt loam
Bw—16 to 45 inches; silt loam
Bk—45 to 60 inches; loam

Additional Components

Bighole and similar soils: 5 percent

35A—Philipsburg-Mussigbrod complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 7,010 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Philipsburg and similar soils
Composition: 60 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 2 percent

Elevation: 6,100 to 7,010 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.4 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 14 inches; silt loam
Bt1—14 to 20 inches; silty clay loam
Bt2—20 to 32 inches; clay loam
Bk1—32 to 43 inches; gravelly loam
Bk2—43 to 60 inches; very gravelly sandy loam

Mussigbrod and similar soils
Composition: 25 percent
Geomorphic description: Mima mound
Slope: 0 to 2 percent
Elevation: 6,100 to 7,010 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches
Typical profile:
A1—0 to 3 inches; gravelly loam
A2—3 to 9 inches; gravelly loam
A3—9 to 17 inches; gravelly loam
Bk—17 to 27 inches; loam
Ab—27 to 38 inches; loam
Bwb—38 to 49 inches; loam
2C—49 to 60 inches; extremely gravelly sand

Additional Components

Donald and similar soils: 5 percent
Libeg and similar soils: 5 percent
Philipsburg, greater slopes and similar soils: 3 percent
Hooligan and similar soils: 2 percent

35D—Philipsburg-Mussigbrod complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Philipsburg and similar soils
Composition: 50 percent
Geomorphic description: Fan remnant
Slope: 4 to 15 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.4 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 14 inches; silt loam
Bt1—14 to 20 inches; silty clay loam
Bt2—20 to 32 inches; clay loam
Bk1—32 to 43 inches; gravelly loam
Bk2—43 to 60 inches; very gravelly sandy loam

Mussigbrod and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant
Slope: 4 to 15 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.1 inches
Typical profile:
A1—0 to 3 inches; loam
A2—3 to 8 inches; loam
A3—8 to 17 inches; loam
Bk—17 to 27 inches; loam
Ab—27 to 38 inches; loam

Bwb—38 to 49 inches; loam
2C—49 to 60 inches; extremely gravelly sand

Additional Components

Donald and similar soils: 10 percent
Libeg and similar soils: 10 percent

36C—Monaberg loam, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Monaberg and similar soils
Composition: 85 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,100 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Additional Components

Libeg and similar soils: 7 percent
Adel and similar soils: 5 percent
Monaberg, lesser slopes and similar soils: 3 percent

37B—Wisdom-Bighole complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,830 to 6,800 feet

Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Wisdom and similar soils
Composition: 50 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,830 to 6,800 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 14 inches; silt loam
Bw—14 to 27 inches; loam
2C—27 to 60 inches; extremely gravelly sand

Bighole and similar soils
Composition: 35 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,830 to 6,800 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 8 inches; silt loam
A2—8 to 17 inches; silt loam
Bt/E—17 to 26 inches; silt loam
Bt—26 to 41 inches; clay loam
Bk—41 to 60 inches; silt loam

Additional Components

Cowcamp and similar soils: 10 percent
Shewag and similar soils: 2 percent
Finn and similar soils: 1 percent
Mooseflat and similar soils: 1 percent
Tepete and similar soils: 1 percent

38B—Englejard-Mussigbrod-Monaberg complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Englejard and similar soils
Composition: 35 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 5,900 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Coarse-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches
Typical profile:
A—0 to 9 inches; loam
Bw—9 to 27 inches; very fine sandy loam
BC—27 to 35 inches; fine sandy loam
2C—35 to 60 inches; very gravelly loamy sand

Mussigbrod and similar soils
Composition: 30 percent
Geomorphic description: Mima mound
Slope: 0 to 4 percent
Elevation: 5,900 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches
Typical profile:
A1—0 to 3 inches; gravelly loam
A2—3 to 9 inches; gravelly loam
A3—9 to 17 inches; gravelly loam
Bk—17 to 27 inches; loam
Ab—27 to 38 inches; loam
Bwb—38 to 49 inches; loam
2C—49 to 60 inches; extremely gravelly sand

Monaberg and similar soils
Composition: 20 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 5,900 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Additional Components

Wisdom and similar soils: 9 percent
Bearmouth and similar soils: 5 percent
Libeg and similar soils: 1 percent

39B—Shewag very gravelly loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,700 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Shewag and similar soils
Composition: 85 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 6,100 to 6,700 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.1 inches

Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 9 inches; very gravelly loam
Bw—9 to 18 inches; extremely gravelly sandy loam
2C—18 to 60 inches; extremely gravelly sand

Additional Components

Wisdom and similar soils: 10 percent
Foxgulch and similar soils: 4 percent
Bearmouth and similar soils: 1 percent

40B—Mooseflat loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,940 to 6,960 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Mooseflat and similar soils
Composition: 80 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 5,940 to 6,970 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Additional Components

Foxgulch and similar soils: 10 percent
Water: 5 percent
Copperbasin and similar soils: 2 percent
Redfish and similar soils: 2 percent
Tepete and similar soils: 1 percent

41A—Proposal-Lehunt complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Proposal and similar soils
Composition: 60 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 5,900 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.3 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 16 inches; silt loam
Bw—16 to 45 inches; silt loam
Bk—45 to 60 inches; loam

Lehunt and similar soils
Composition: 25 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 5,900 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Fine sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.5 inches
Typical profile:
A—0 to 3 inches; fine sandy loam
E—3 to 7 inches; fine sandy loam
Btn—7 to 11 inches; sandy clay
Btkn—11 to 15 inches; loam
BCn1—15 to 32 inches; sandy loam

BCn2—32 to 40 inches; sandy clay loam
2C—40 to 60 inches; extremely gravelly sand

Additional Components

Bighole and similar soils: 5 percent
Lehunt, saline and similar soils: 5 percent
Wisdom and similar soils: 5 percent

42A—Lehunt-Lehunt, saline, complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Lehunt and similar soils
Composition: 50 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 5,900 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Fine sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.5 inches
Typical profile:
A—0 to 3 inches; fine sandy loam
E—3 to 7 inches; fine sandy loam
Btn—7 to 11 inches; sandy clay
Btkn—11 to 15 inches; loam
BCn1—15 to 32 inches; sandy loam
BCn2—32 to 40 inches; sandy clay loam
2C—40 to 60 inches; extremely gravelly sand

Lehunt, saline and similar soils
Composition: 35 percent
Geomorphic description: Stream terrace
Slope: 0 to 2 percent
Elevation: 5,900 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Fine sandy loam

Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Saline fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches
Typical profile:
E—0 to 7 inches; fine sandy loam
Btn—7 to 11 inches; sandy clay
Btkn—11 to 15 inches; loam
BCn1—15 to 32 inches; sandy loam
BCn2—32 to 40 inches; sandy clay loam
2C—40 to 60 inches; extremely gravelly sand

Additional Components

Proposal and similar soils: 10 percent
Bighole and similar soils: 5 percent

43B—Redfish-Slagamelt-Shewag complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,200 to 7,000 feet
Mean annual precipitation: 16 to 20 inches
Frost-free period: 30 to 50 days

Component Description

Redfish and similar soils
Composition: 35 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 6,200 to 7,000 feet
Effective annual precipitation: 16 to 20 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Ponding duration: Very long
Available water capacity: Mainly 3.0 inches
Typical profile:
Oi—0 to 4 inches; slightly decomposed plant material
A—4 to 11 inches; gravelly loam

Ag—11 to 16 inches; very gravelly loam
2Cg—16 to 60 inches; extremely gravelly loamy coarse sand

Slagamelt and similar soils
Composition: 30 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 6,200 to 7,000 feet
Effective annual precipitation: 16 to 20 inches
Frost-free period: 30 to 50 days
Surface layer texture: Cobbly silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Outwash
Native plant cover type: Forestland
Flooding: None
Water table: Present
Available water capacity: Mainly 3.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 7 inches; cobbly silt loam
Bw1—7 to 16 inches; very cobbly loam
Bw2—16 to 27 inches; very gravelly loam
C—27 to 34 inches; very gravelly sandy loam
2C—34 to 60 inches; extremely gravelly sand

Shewag and similar soils
Composition: 15 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 6,200 to 7,000 feet
Effective annual precipitation: 16 to 20 inches
Frost-free period: 30 to 50 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 9 inches; cobbly loam
Bw—9 to 18 inches; extremely gravelly sandy loam
2C—18 to 60 inches; extremely gravelly sand

Additional Components

Bearmouth, stony and similar soils: 10 percent
Tepete and similar soils: 8 percent
Water: 2 percent

44C—Beaverslide-Cowcamp complex, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,400 to 7,100 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Beaverslide and similar soils
Composition: 60 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,400 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Calcareous clayey alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 12 inches; silt loam
E/Bt—12 to 15 inches; silt loam
Bt—15 to 21 inches; clay
Btk—21 to 37 inches; silty clay loam
Bk—37 to 60 inches; clay loam

Cowcamp and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,400 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.2 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; silt loam
A2—6 to 13 inches; silt loam
Bt/E—13 to 18 inches; gravelly silt loam

Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Additional Components

Bighole and similar soils: 8 percent
Beaverslide, lesser slopes and similar soils: 2 percent
Libeg, stony and similar soils: 2 percent
Mooseflat and similar soils: 2 percent
Tepete and similar soils: 1 percent

45D—Hooligan-Monaberg complex, 2 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,490 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Hooligan and similar soils
Composition: 50 percent
Geomorphic description: Hillslope
Slope: 2 to 15 percent
Elevation: 6,100 to 6,490 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Fine-loamy alluvium over residuum weathered from siltstone
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.3 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 10 inches; loam
Bt1—10 to 26 inches; gravelly clay loam
Bt2—26 to 35 inches; clay loam
Cr—35 to 60 inches; weathered bedrock

Monaberg and similar soils
Composition: 35 percent
Geomorphic description: Hillslope
Slope: 2 to 15 percent
Elevation: 6,100 to 6,490 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Additional Components

Monaberg, lesser slopes and similar soils: 5 percent
Donald and similar soils: 4 percent
Inabnit and similar soils: 3 percent
Hooligan, greater slopes and similar soils: 2 percent
Lehunt and similar soils: 1 percent

46E—Barbarela-Rogert complex, 8 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,080 to 7,180 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Barbarela and similar soils
Composition: 60 percent
Geomorphic description: Hillslope
Slope: 8 to 35 percent
Elevation: 6,080 to 7,180 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite and gneiss and/or schist
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A—0 to 4 inches; loam
AB—4 to 10 inches; gravelly loam
Bt1—10 to 17 inches; gravelly sandy clay loam
Bt2—17 to 25 inches; gravelly sandy clay loam
Cr—25 to 42 inches; weathered bedrock
R—42 to 60 inches; unweathered bedrock

Rogert and similar soils
Composition: 25 percent

Geomorphic description: Hillslope; ridge
Slope: 8 to 35 percent
Elevation: 6,080 to 7,180 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly sandy loam
Depth to restrictive feature: Lithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum weathered from granite
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.2 inches
Typical profile:
A—0 to 7 inches; very gravelly sandy loam
C—7 to 13 inches; very gravelly sandy loam
R—13 to 60 inches; unweathered bedrock

Additional Components

Danielvil and similar soils: 5 percent
Rock outcrop: 5 percent
Barbarela, greater slopes and similar soils: 2 percent
Rogert, greater slopes, very stony and similar soils: 2 percent
Finn and similar soils: 1 percent

47C—Libeg-Adel complex, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,150 to 7,100 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 65 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,150 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.7 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 10 inches; loam
Bt1—10 to 17 inches; very gravelly sandy clay loam

Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Adel and similar soils
Composition: 20 percent
Geomorphic description: Mima mound
Slope: 2 to 8 percent
Elevation: 6,150 to 7,100 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches
Typical profile:
A1—0 to 9 inches; silt loam
A2—9 to 16 inches; silt loam
Bw1—16 to 28 inches; silt loam
Bw2—28 to 43 inches; silt loam
Bw3—43 to 52 inches; silt loam
C—52 to 60 inches; gravelly loam

Additional Components

Monaberg and similar soils: 9 percent
Libeg, greater slopes and similar soils: 3 percent
Tiban, stony and similar soils: 3 percent

47D—Libeg-Adel complex, 8 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,900 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 70 percent
Geomorphic description: Hillslope
Slope: 8 to 15 percent
Elevation: 6,100 to 6,900 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None

Available water capacity: Mainly 5.7 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 10 inches; loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Adel and similar soils
Composition: 20 percent
Geomorphic description: Hillslope
Slope: 8 to 15 percent
Elevation: 6,100 to 6,900 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches
Typical profile:
A1—0 to 9 inches; silt loam
A2—9 to 16 inches; silt loam
Bw1—16 to 28 inches; silt loam
Bw2—28 to 43 inches; silt loam
Bw3—43 to 52 inches; silt loam
C—52 to 60 inches; gravelly loam

Additional Components

Monaberg and similar soils: 4 percent
Philipsburg and similar soils: 4 percent
Libeg, greater slopes and similar soils: 2 percent

48E—Libeg-Sebud, very stony complex, 15 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,830 to 7,760 feet
Mean annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 50 percent
Geomorphic description: Mountain slope
Slope: 15 to 35 percent
Elevation: 5,830 to 7,760 feet
Effective annual precipitation: 18 to 24 inches

Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches
Typical profile:
A1—0 to 5 inches; very gravelly loam
A2—5 to 10 inches; very gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Sebud, very stony and similar soils
Composition: 30 percent
Geomorphic description: Mountain slope
Slope: 15 to 35 percent
Elevation: 5,830 to 7,760 feet
Effective annual precipitation: 18 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.10 to 3.00 percent stones
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Gravelly alluvium and/or colluvium derived from igneous and metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A—0 to 11 inches; very cobbly loam
Bw1—11 to 22 inches; very gravelly loam
Bw2—22 to 37 inches; very gravelly loam
C—37 to 60 inches; extremely gravelly sandy loam

Additional Components

Nieman, stony and similar soils: 8 percent
Sebud, greater slopes, bouldery and similar soils: 7 percent
Monaberg and similar soils: 5 percent

49A—Wisdom-Proposal complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,360 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Wisdom and similar soils
Composition: 40 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,000 to 6,360 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 14 inches; silt loam
Bw—14 to 27 inches; loam
2C—27 to 60 inches; extremely gravelly sand

Proposal and similar soils
Composition: 30 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,000 to 6,360 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.3 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 16 inches; silt loam
Bw—16 to 45 inches; silt loam
Bk—45 to 60 inches; loam

Additional Components

Foxgulch and similar soils: 10 percent
Cowcamp and similar soils: 5 percent
Mooseflat and similar soils: 5 percent
Shewag and similar soils: 5 percent
Bearmouth and similar soils: 3 percent
Water: 2 percent

50E—Libeg-Monad complex, 8 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 6,100 to 6,900 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 40 percent
Geomorphic description: Hillslope
Slope: 8 to 35 percent
Elevation: 6,100 to 6,900 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 5 inches; gravelly loam
A2—5 to 10 inches; gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Monad and similar soils
Composition: 40 percent
Geomorphic description: Hillslope
Slope: 8 to 35 percent
Elevation: 6,100 to 6,900 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.1 inches
Typical profile:
A—0 to 15 inches; gravelly loam
Bt/E—15 to 20 inches; loam
Bt1—20 to 29 inches; gravelly clay loam
Bt2—29 to 60 inches; gravelly clay loam

Additional Components

Adel and similar soils: 5 percent
Butchhill and similar soils: 5 percent
Hairpin and similar soils: 5 percent
Sebud and similar soils: 5 percent

51A—Libeg-Adel complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,700 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Libeg and similar soils
Composition: 60 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,000 to 6,700 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 5 inches; gravelly loam
A2—5 to 10 inches; gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Adel and similar soils
Composition: 20 percent
Geomorphic description: Mima mound
Slope: 0 to 2 percent
Elevation: 6,000 to 6,700 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches

Typical profile:
A1—0 to 9 inches; silt loam
A2—9 to 16 inches; silt loam
Bw1—16 to 28 inches; silt loam
Bw2—28 to 43 inches; silt loam
Bw3—43 to 52 inches; silt loam
C—52 to 60 inches; gravelly loam

Additional Components

Cowcamp and similar soils: 10 percent
Monaberg and similar soils: 5 percent
Ratiopeak and similar soils: 5 percent

52A—Plimpton-Cowcamp complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Plimpton and similar soils
Composition: 50 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,100 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 9 inches; silt loam
A2—9 to 19 inches; loam
Bt—19 to 38 inches; sandy clay loam
BC—38 to 60 inches; gravelly sandy clay loam

Cowcamp and similar soils
Composition: 40 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted

Drainage class: Well drained
Parent material: Loamy skeletal outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.2 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; silt loam
A2—6 to 13 inches; silt loam
Bt/E—13 to 18 inches; gravelly silt loam
Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Additional Components

Mooseflat and similar soils: 10 percent

52C—Plimpton-Cowcamp complex, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 7,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Plimpton and similar soils
Composition: 50 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,100 to 7,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 9 inches; silt loam
A2—9 to 19 inches; loam
Bt—19 to 38 inches; sandy clay loam
BC—38 to 60 inches; gravelly sandy clay loam

Cowcamp and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,000 to 7,300 feet

Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.2 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; silt loam
A2—6 to 13 inches; silt loam
Bt/E—13 to 18 inches; gravelly silt loam
Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Additional Components

Beaverslide and similar soils: 10 percent
Libeg and similar soils: 5 percent
Monaberg and similar soils: 5 percent

53A—Briston-Mussigbrod complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Briston and similar soils
Composition: 40 percent
Geomorphic description: Outwash plain
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.1 inches
Typical profile:
A—0 to 4 inches; loam
BA—4 to 9 inches; loam
Bt1—9 to 20 inches; gravelly clay loam
Bt2—20 to 29 inches; gravelly clay loam

Bt3—29 to 39 inches; extremely gravelly sandy clay loam
C—39 to 60 inches; extremely gravelly loamy sand

Mussigbrod and similar soils
Composition: 30 percent
Geomorphic description: Mima mound
Slope: 0 to 2 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.1 inches
Typical profile:
A1—0 to 3 inches; loam
A2—3 to 8 inches; loam
A3—8 to 17 inches; loam
Bk—17 to 27 inches; loam
Ab—27 to 38 inches; loam
Bwb—38 to 49 inches; loam
2C—49 to 60 inches; extremely gravelly sand

Additional Components

Philipsburg and similar soils: 10 percent
Adel and similar soils: 5 percent
Libeg and similar soils: 5 percent
Wisdom and similar soils: 5 percent
Cowcamp and similar soils: 4 percent
Mooseflat and similar soils: 1 percent

54A—Mooseflat-Eachuston-Copperbasin complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,200 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Mooseflat and similar soils
Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; silt loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Eachuston and similar soils
Composition: 30 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 3.5 inches
Typical profile:
OE—0 to 2 inches; moderately decomposed plant material
A—2 to 6 inches; silt loam
ACg—6 to 10 inches; silt loam
2C—10 to 60 inches; extremely gravelly sand

Copperbasin and similar soils
Composition: 20 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 7 inches; very gravelly loam

AC—7 to 16 inches; extremely cobbly loamy sand
C1—16 to 35 inches; extremely cobbly sand
C2—35 to 60 inches; extremely cobbly sand

Additional Components

Water: 5 percent
Foolhen and similar soils: 3 percent
Foxgulch and similar soils: 1 percent
Tepete and similar soils: 1 percent

56B—Englejard-Bearmouth complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,200 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Englejard and similar soils
Composition: 50 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Fine sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Coarse-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.4 inches
Typical profile:
A—0 to 9 inches; fine sandy loam
Bw—9 to 27 inches; very fine sandy loam
BC—27 to 35 inches; fine sandy loam
2C—35 to 60 inches; very gravelly loamy sand

Bearmouth and similar soils
Composition: 35 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium and/or outwash

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 5 inches; gravelly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Additional Components

Danielvil and similar soils: 5 percent
Shewag and similar soils: 5 percent
Wisdom and similar soils: 5 percent

57C—Englejard-Monaberg-Mussigbrod complex, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,200 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Englejard and similar soils
Composition: 35 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Coarse-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches
Typical profile:
A—0 to 9 inches; loam
Bw—9 to 27 inches; very fine sandy loam
BC—27 to 35 inches; fine sandy loam
2C—35 to 60 inches; very gravelly loamy sand

Monaberg and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Mussigbrod and similar soils
Composition: 20 percent
Geomorphic description: Mima mound
Slope: 2 to 8 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.1 inches
Typical profile:
A1—0 to 3 inches; loam
A2—3 to 8 inches; loam
A3—8 to 17 inches; loam
Bk—17 to 27 inches; loam
Ab—27 to 38 inches; loam
Bwb—38 to 49 inches; loam
2C—49 to 60 inches; extremely gravelly sand

Additional Components

Bearmouth and similar soils: 8 percent
Libeg and similar soils: 6 percent
Philipsburg and similar soils: 4 percent
Danielvil and similar soils: 2 percent

58B—Danielvil-Englejard-Philipsburg complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,200 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Danielvil and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant
Slope: 0 to 4 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very fine sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Coarse-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches
Typical profile:
A—0 to 11 inches; very fine sandy loam
Bw—11 to 29 inches; fine sandy loam
C1—29 to 37 inches; fine sandy loam
C2—37 to 47 inches; gravelly fine sandy loam
C3—47 to 60 inches; gravelly sandy loam

Englejard and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant
Slope: 0 to 4 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Coarse-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches
Typical profile:
A—0 to 9 inches; loam
Bw—9 to 27 inches; very fine sandy loam
BC—27 to 35 inches; fine sandy loam
2C—35 to 60 inches; very gravelly loamy sand

Philipsburg and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 0 to 4 percent
Elevation: 5,900 to 6,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 8.4 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 14 inches; silt loam
Bt1—14 to 20 inches; silty clay loam
Bt2—20 to 32 inches; clay loam
Bk1—32 to 43 inches; gravelly loam
Bk2—43 to 60 inches; very gravelly sandy loam

Additional Components

Libeg and similar soils: 8 percent
Mussigbrod and similar soils: 5 percent
Bearmouth and similar soils: 3 percent
Danielvil, greater slopes and similar soils: 2 percent
Wisdom and similar soils: 2 percent

59D—Adel silt loam, 8 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Adel and similar soils
Composition: 80 percent
Geomorphic description: Fan remnant
Slope: 8 to 15 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches
Typical profile:
A1—0 to 9 inches; silt loam
A2—9 to 16 inches; silt loam
Bw1—16 to 28 inches; silt loam
Bw2—28 to 43 inches; silt loam
Bw3—43 to 52 inches; silt loam
C—52 to 60 inches; gravelly loam

Additional Components

Adel, lesser slopes and similar soils: 5 percent
Libeg and similar soils: 5 percent

Libeg, greater slopes and similar soils: 5 percent
Mussigbrod and similar soils: 5 percent

60A—Cowcamp-Maybee complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,600 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Cowcamp and similar soils
Composition: 50 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 2 percent
Elevation: 6,000 to 6,600 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.2 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; silt loam
A2—6 to 13 inches; silt loam
Bt/E—13 to 18 inches; gravelly silt loam
Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Maybee and similar soils
Composition: 35 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 2 percent
Elevation: 6,000 to 6,600 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal over sandy skeletal alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.3 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam

A2—7 to 12 inches; gravelly loam
Bt1—12 to 21 inches; very gravelly clay loam
Bt2—21 to 27 inches; very cobbly sandy clay loam
2C—27 to 60 inches; very cobbly loamy sand

Additional Components

Plimpton and similar soils: 5 percent
Beaverslide and similar soils: 4 percent
Libeg and similar soils: 2 percent
Shewag and similar soils: 2 percent
Finn and similar soils: 1 percent
Mooseflat and similar soils: 1 percent

61D—Barbarela-Monaberg-Nieman complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Barbarela and similar soils
Composition: 40 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite and gneiss and/or schist
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A—0 to 4 inches; loam
AB—4 to 10 inches; gravelly loam
Bt1—10 to 17 inches; gravelly sandy clay loam
Bt2—17 to 25 inches; gravelly sandy clay loam
Cr—25 to 42 inches; weathered bedrock
R—42 to 60 inches; unweathered bedrock

Monaberg and similar soils
Composition: 30 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,000 to 6,300 feet

Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Nieman and similar soils
Composition: 15 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: Lithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.5 inches
Typical profile:
A—0 to 5 inches; gravelly loam
Bt—5 to 12 inches; extremely cobbly sandy clay loam
C—12 to 16 inches; extremely cobbly sandy clay loam
R—16 to 60 inches; unweathered bedrock

Additional Components

Philipsburg and similar soils: 5 percent
Danielvil and similar soils: 4 percent
Englejard and similar soils: 3 percent
Inabnit and similar soils: 2 percent
Rock outcrop: 1 percent

62D—Doolittle-Philipsburg-Hooligan complex, 2 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,260 feet

Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Doolittle and similar soils
Composition: 30 percent
Geomorphic description: Depression; hillslope; slump
Slope: 4 to 15 percent
Elevation: 5,900 to 6,260 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Clay loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Alluvium and/or colluvium over residuum weathered from calcareous siltstone
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.0 inches
Typical profile:
A—0 to 3 inches; clay loam
Bt1—3 to 12 inches; silty clay loam
Bt2—12 to 28 inches; silty clay
Bk—28 to 39 inches; paragravelly silt loam
Cr—39 to 60 inches; weathered bedrock

Philipsburg and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 5,900 to 6,260 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.4 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 14 inches; silt loam
Bt1—14 to 20 inches; silty clay loam
Bt2—20 to 32 inches; clay loam
Bk1—32 to 43 inches; gravelly loam
Bk2—43 to 60 inches; very gravelly sandy loam

Hooligan and similar soils
Composition: 15 percent
Geomorphic description: Hillslope
Slope: 4 to 15 percent
Elevation: 5,900 to 6,260 feet
Effective annual precipitation: 14 to 19 inches

Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Fine-loamy alluvium over residuum weathered from siltstone
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.3 inches
Typical profile:
A1—0 to 5 inches; silt loam
A2—5 to 10 inches; loam
Bt1—10 to 26 inches; gravelly clay loam
Bt2—26 to 35 inches; clay loam
Cr—35 to 60 inches; weathered bedrock

Additional Components

Donald and similar soils: 10 percent
Inabnit, stony and similar soils: 7 percent
Monaberg and similar soils: 5 percent
Ratiopeak, very stony and similar soils: 5 percent
Beaverslide and similar soils: 4 percent
Finn and similar soils: 3 percent
Rock outcrop: 1 percent

63C—Cowcamp gravelly loam, 2 to 8 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,100 to 6,600 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Cowcamp and similar soils
Composition: 85 percent
Geomorphic description: Fan remnant
Slope: 2 to 8 percent
Elevation: 6,100 to 6,600 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.8 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 6 inches; gravelly loam
A2—6 to 13 inches; gravelly loam
Bt/E—13 to 18 inches; gravelly silt loam

Bt1—18 to 28 inches; very cobbly clay loam
Bt2—28 to 35 inches; very gravelly loam
BC—35 to 60 inches; very gravelly sandy loam

Additional Components

Maybee and similar soils: 5 percent
Plimpton and similar soils: 5 percent
Beaverslide and similar soils: 2 percent
Libeg and similar soils: 2 percent
Finn and similar soils: 1 percent

64D—Monaberg-Maurice, bouldery-Barbarela complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,970 to 6,690 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Monaberg and similar soils
Composition: 35 percent
Geomorphic description: Ground moraine
Slope: 4 to 15 percent
Elevation: 5,970 to 6,690 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy till
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Maurice, bouldery and similar soils
Composition: 30 percent
Geomorphic description: Ground moraine
Slope: 4 to 15 percent
Elevation: 5,970 to 6,690 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam

Rock fragments on the soil surface: 0.01 to 0.10 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal till derived from granite
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 6 inches; gravelly loam
A2—6 to 15 inches; gravelly loam
Bw—15 to 34 inches; extremely gravelly sandy loam
BC—34 to 60 inches; very gravelly sandy loam

Barbarela and similar soils
Composition: 20 percent
Geomorphic description: Ground moraine
Slope: 4 to 15 percent
Elevation: 5,970 to 6,690 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Till over residuum weathered from granite and gneiss and/or schist
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.0 inches
Typical profile:
A—0 to 4 inches; gravelly loam
AB—4 to 10 inches; gravelly loam
Bt1—10 to 17 inches; gravelly sandy clay loam
Bt2—17 to 25 inches; gravelly sandy clay loam
Cr—25 to 42 inches; weathered bedrock
R—42 to 60 inches; unweathered bedrock

Additional Components

Maurice, greater slopes, stony and similar soils: 6 percent
Adel and similar soils: 3 percent
Donald and similar soils: 2 percent
Libeg, very stony and similar soils: 2 percent
Plimpton and similar soils: 2 percent

65E—Maurice, bouldery-Monad complex, 8 to 25 percent slopes

Map Unit Setting

Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,100 to 6,620 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days

Component Description

Maurice, bouldery and similar soils
Composition: 55 percent
Geomorphic description: Ground moraine
Slope: 8 to 25 percent
Elevation: 6,100 to 6,620 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal till derived from granite
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 6 inches; gravelly loam
A2—6 to 15 inches; gravelly loam
Bw—15 to 34 inches; extremely gravelly sandy loam
BC—34 to 60 inches; very gravelly sandy loam

Monad and similar soils
Composition: 30 percent
Geomorphic description: Ground moraine
Slope: 8 to 25 percent
Elevation: 6,100 to 6,620 feet
Effective annual precipitation: 20 to 24 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy till
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches
Typical profile:
A—0 to 15 inches; loam
Bt/E—15 to 20 inches; loam
Bt1—20 to 29 inches; gravelly clay loam
Bt2—29 to 60 inches; gravelly clay loam

Additional Components

Maurice, very bouldery and similar soils: 7 percent
Hairpin and similar soils: 5 percent
Libeg, bouldery and similar soils: 2 percent
Nieman, bouldery and similar soils: 1 percent

66E—Monaberg-Libeg complex, 8 to 35 percent slopes

Map Unit Setting

Field investigation intensity: Order 3
Landscape: Intermontane basin
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Monaberg and similar soils
Composition: 60 percent
Geomorphic description: Fan remnant; hillslope
Slope: 8 to 35 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.1 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 11 inches; loam
Bt1—11 to 37 inches; clay loam
Bt2—37 to 45 inches; clay loam
BC1—45 to 52 inches; gravelly sandy clay loam
BC2—52 to 60 inches; gravelly loam

Libeg and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant; hillslope
Slope: 8 to 35 percent
Elevation: 6,000 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Loamy skeletal alluvium and/or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
A1—0 to 5 inches; gravelly loam
A2—5 to 10 inches; gravelly loam
Bt1—10 to 17 inches; very gravelly sandy clay loam
Bt2—17 to 24 inches; very gravelly clay loam
Bt3—24 to 60 inches; extremely gravelly sandy clay loam

Additional Components

Donald and similar soils: 5 percent
Libeg, greater slopes and similar soils: 3 percent
Adel and similar soils: 2 percent

110B—Bearmouth gravelly loam, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,800 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Bearmouth and similar soils
Composition: 75 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 5,900 to 6,800 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 5 inches; gravelly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Additional Components

Wisdom and similar soils: 10 percent
Bearmouth, stony and similar soils: 5 percent
Foxgulch and similar soils: 5 percent
Shewag and similar soils: 5 percent

113B—Foxgulch-Bearmouth-Copperbasin complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 6,300 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Foxgulch and similar soils
Composition: 35 percent
Geomorphic description: Drainageway
Slope: 0 to 4 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy over sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Water table: Present
Available water capacity: Mainly 7.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 11 inches; silt loam
A2—11 to 16 inches; silty clay loam
Bw—16 to 29 inches; silt loam
BC—29 to 36 inches; sandy clay loam
2C—36 to 60 inches; very gravelly sand

Bearmouth and similar soils
Composition: 20 percent
Geomorphic description: Outwash plain
Slope: 0 to 4 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 5 inches; gravelly loam
Bw—5 to 13 inches; very gravelly sandy loam
2C—13 to 60 inches; extremely cobbly sand

Copperbasin and similar soils
Composition: 15 percent
Geomorphic description: Depression; drainageway
Slope: 0 to 4 percent
Elevation: 6,000 to 6,300 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Parent material: Sandy and gravelly outwash

Native plant cover type: Rangeland
Flooding: None
Water table: Present
Available water capacity: Mainly 1.8 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 7 inches; very cobbly loam
AC—7 to 16 inches; extremely cobbly loamy sand
C1—16 to 35 inches; extremely cobbly sand
C2—35 to 60 inches; extremely cobbly sand

Additional Components

Mooseflat and similar soils: 10 percent
Wisdom and similar soils: 10 percent
Tepete and similar soils: 5 percent
Water: 5 percent

117A—Nana-Zelda-Foolhen complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,800 to 6,100 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Nana and similar soils
Composition: 30 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,800 to 6,100 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.0 inches
Typical profile:
A—0 to 6 inches; loam
E—6 to 8 inches; fine sandy loam
Btn—8 to 19 inches; clay loam
Cn1—19 to 26 inches; loamy fine sand
2Cn2—26 to 60 inches; very gravelly coarse sand

Zelda and similar soils
Composition: 30 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,800 to 6,100 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.4 inches
Typical profile:
A—0 to 4 inches; loam
E—4 to 9 inches; loamy fine sand
Btn—9 to 21 inches; sandy clay loam
Cn—21 to 44 inches; stratified sandy loam to sandy clay loam
2Cn—44 to 60 inches; very gravelly loamy sand

Foolhen and similar soils
Composition: 25 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,800 to 6,100 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Mucky peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Ponding duration: Brief
Available water capacity: Mainly 7.1 inches
Typical profile:
Oi—0 to 6 inches; slightly decomposed plant material
OE—6 to 11 inches; mucky peat
A—11 to 18 inches; loam
Bw—18 to 29 inches; loam
C—29 to 36 inches; loam
Cg—36 to 60 inches; gravelly loam

Additional Components

Eine and similar soils: 5 percent
Mooseflat and similar soils: 5 percent
Water: 5 percent

123B—Wisdom-Shewag complex, 0 to 4 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 6,000 to 7,200 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Wisdom and similar soils
Composition: 55 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 6,000 to 7,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Fine-loamy over sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 7 inches; silt loam
A2—7 to 14 inches; silt loam
Bw—14 to 27 inches; loam
2C—27 to 60 inches; extremely gravelly sand

Shewag and similar soils
Composition: 35 percent
Geomorphic description: Outwash plain; stream terrace
Slope: 0 to 4 percent
Elevation: 6,000 to 7,200 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium and/or outwash
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 9 inches; very gravelly loam
Bw—9 to 18 inches; extremely gravelly sandy loam
2C—18 to 60 inches; extremely gravelly sand

Additional Components

Plimpton and similar soils: 5 percent
Cowcamp and similar soils: 2 percent
Mooseflat and similar soils: 1 percent
Shewag, stony and similar soils: 1 percent
Tepete and similar soils: 1 percent

134A—Danielvil complex, 0 to 4 percent slopes

Map Unit Setting

Interpretive focus: Forestland
Field investigation intensity: Order 2
Elevation: 5,690 to 6,310 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Danielvil and similar soils
Composition: 80 percent
Geomorphic description: Stream terrace
Slope: 0 to 4 percent
Elevation: 5,690 to 6,320 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.9 inches
Typical profile:
A1—0 to 5 inches; sandy loam
A2—5 to 13 inches; loam
Bw—13 to 23 inches; gravelly sandy loam
BC—23 to 34 inches; gravelly sandy loam
2C—34 to 60 inches; gravelly coarse sandy loam

Danielvil, wet and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 4 percent
Elevation: 5,690 to 6,320 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present

Available water capacity: Mainly 6.9 inches
Typical profile:
A1—0 to 5 inches; loam
A2—5 to 13 inches; loam
Bw—13 to 23 inches; gravelly sandy loam
BC—23 to 34 inches; gravelly sandy loam
2C—34 to 60 inches; gravelly coarse sandy loam

237U—Garlet-Como-Lilylake families, complex, trough bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,920 to 8,070 feet
Mean annual precipitation: 16 to 38 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 40 percent
Geomorphic description: Glacial-valley floor
Slope: 0 to 20 percent
Elevation: 5,920 to 8,070 feet
Effective annual precipitation: 16 to 38 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Glaciofluvial deposits derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Como and similar soils
Composition: 20 percent
Geomorphic description: Glacial-valley floor
Slope: 0 to 20 percent
Elevation: 5,920 to 8,070 feet
Effective annual precipitation: 16 to 38 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Glaciofluvial deposits derived from quartzite

Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Lilylake and similar soils
Composition: 20 percent
Geomorphic description: Drainageway; glacial-valley floor
Slope: 0 to 10 percent
Elevation: 5,920 to 8,070 feet
Effective annual precipitation: 16 to 38 inches
Frost-free period: 20 to 60 days
Surface layer texture: Muck
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Glaciofluvial deposits derived from quartzite
Native plant cover type: Forestland
Flooding: Occasional
Water table: Present
Ponding duration: Brief
Available water capacity: Mainly 1.4 inches
Typical profile:
OA—0 to 12 inches; muck
C1—12 to 15 inches; gravelly coarse sand
C2—15 to 60 inches; extremely gravelly coarse sand

Additional Components

Elvick and similar soils: 10 percent
Lowder and similar soils: 10 percent

237Ua—Rubycreek-Bata-Lowder families, complex, trough bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,490 to 8,760 feet
Mean annual precipitation: 20 to 49 inches
Frost-free period: 20 to 60 days

Component Description

Rubycreek and similar soils
Composition: 30 percent
Geomorphic description: Glacial-valley floor
Slope: 0 to 10 percent
Elevation: 6,490 to 8,760 feet
Effective annual precipitation: 20 to 49 inches

Frost-free period: 20 to 60 days
Surface layer texture: Ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over glaciofluvial deposits derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 3 inches; ashy silt loam
Bw—3 to 12 inches; ashy silt loam
2Bw—12 to 20 inches; very stony loam
2BC—20 to 29 inches; very cobbly loam
2C—29 to 60 inches; very cobbly sandy loam

Bata and similar soils
Composition: 20 percent
Geomorphic description: Glacial-valley floor
Slope: 0 to 10 percent
Elevation: 6,490 to 8,760 feet
Effective annual precipitation: 20 to 49 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Lowder and similar soils
Composition: 20 percent
Geomorphic description: Drainageway; glacial-valley floor
Slope: 0 to 10 percent
Elevation: 6,490 to 8,760 feet
Effective annual precipitation: 20 to 49 inches
Frost-free period: 20 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Glaciofluvial deposits derived from quartzite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 3.8 inches

Typical profile:
Oi—0 to 4 inches; peat
A—4 to 11 inches; very cobbly loam
Bg—11 to 37 inches; very gravelly sandy clay loam
BCg—37 to 60 inches; very gravelly sandy loam

Additional Components

Lilylake and similar soils: 10 percent
Littlesalmon and similar soils: 10 percent
Rock outcrop: 5 percent
Rubble land: 5 percent

300E—Poin-Barbarela-Rock outcrop complex, 15 to 45 percent slopes

Map Unit Setting

Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,900 to 6,820 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Poin and similar soils
Composition: 50 percent
Geomorphic description: Mountain slope
Slope: 15 to 45 percent
Elevation: 5,900 to 6,820 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Sandy loam
Depth to restrictive feature: Lithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly colluvium over residuum weathered from igneous and metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches
Typical profile:
A1—0 to 4 inches; sandy loam
A2—4 to 8 inches; gravelly sandy loam
Bw—8 to 16 inches; very gravelly sandy loam
C—16 to 19 inches; extremely channery loamy sand
R—19 to 60 inches; unweathered bedrock

Barbarela and similar soils
Composition: 30 percent
Geomorphic description: Mountain slope
Slope: 15 to 45 percent
Elevation: 5,900 to 6,820 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Surface layer texture: Loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite and gneiss and/or schist
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A—0 to 4 inches; loam
AB—4 to 10 inches; gravelly loam
Bt1—10 to 17 inches; gravelly sandy clay loam
Bt2—17 to 25 inches; gravelly sandy clay loam
Cr—25 to 42 inches; weathered bedrock
R—42 to 60 inches; unweathered bedrock

Rock outcrop
Composition: 15 percent
Geomorphic description: None assigned

Additional Components

Poin, very bouldery and similar soils: 5 percent

301D—Barbarela-Poin complex, 4 to 15 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Mountains
Elevation: 5,900 to 6,500 feet
Mean annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days

Component Description

Barbarela and similar soils
Composition: 60 percent
Geomorphic description: Mountain slope
Slope: 4 to 15 percent
Elevation: 5,900 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite and gneiss and/or schist
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A—0 to 4 inches; loam
AB—4 to 10 inches; gravelly loam
Bt1—10 to 17 inches; gravelly sandy clay loam
Bt2—17 to 25 inches; gravelly sandy clay loam

Cr—25 to 42 inches; weathered bedrock
R—42 to 60 inches; unweathered bedrock

Poin and similar soils
Composition: 35 percent
Geomorphic description: Mountain slope
Slope: 4 to 15 percent
Elevation: 5,900 to 6,500 feet
Effective annual precipitation: 14 to 19 inches
Frost-free period: 30 to 50 days
Surface layer texture: Sandy loam
Depth to restrictive feature: Lithic bedrock: 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly colluvium over residuum weathered from igneous and metamorphic rock
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches
Typical profile:
A1—0 to 4 inches; sandy loam
A2—4 to 8 inches; gravelly sandy loam
Bw—8 to 16 inches; very gravelly sandy loam
C—16 to 19 inches; extremely channery loamy sand
R—19 to 60 inches; unweathered bedrock

Additional Components

Rock outcrop: 5 percent

347Sa—Waldbillig-Bata-Upsata families, complex, glacial moraines

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,670 to 8,790 feet
Mean annual precipitation: 18 to 41 inches
Frost-free period: 20 to 60 days

Component Description

Waldbillig and similar soils
Composition: 35 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,670 to 8,790 feet
Effective annual precipitation: 18 to 41 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over till derived from quartzite

Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.5 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 4 inches; gravelly ashy loam
Bw—4 to 10 inches; gravelly ashy loam
2E—10 to 43 inches; very gravelly sandy loam
2E/Bw—43 to 60 inches; very gravelly sandy loam

Bata and similar soils
Composition: 25 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,670 to 8,790 feet
Effective annual precipitation: 18 to 41 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Upsata and similar soils
Composition: 15 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,670 to 8,790 feet
Effective annual precipitation: 18 to 41 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Volcanic ash over till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 13 inches; gravelly ashy silt loam
2E—13 to 20 inches; gravelly fine sandy loam
2E/Bw—20 to 60 inches; extremely gravelly loamy sand

Additional Components

Lowder and similar soils: 10 percent
Elkner and similar soils: 5 percent
Garlet and similar soils: 5 percent
Rock outcrop: 5 percent

347X—Elve-Gateview-Sebud families, complex, glacial moraines

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,560 to 8,660 feet
Mean annual precipitation: 18 to 31 inches
Frost-free period: 30 to 70 days

Component Description

Elve and similar soils
Composition: 40 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,560 to 8,660 feet
Effective annual precipitation: 18 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly sandy loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Gateview and similar soils
Composition: 20 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,560 to 8,660 feet
Effective annual precipitation: 18 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Till derived from quartzite

Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches
Typical profile:
A1—0 to 8 inches; gravelly loam
A2—8 to 39 inches; very gravelly loam
2C—39 to 60 inches; very cobbly sand

Sebud and similar soils
Composition: 20 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,560 to 8,660 feet
Effective annual precipitation: 18 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Stony loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches
Typical profile:
A1—0 to 4 inches; stony loam
A2—4 to 10 inches; very stony sandy loam
Bw1—10 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Additional Components

Como and similar soils: 10 percent
Libeg and similar soils: 10 percent

348Sa—Upsata-Bata-Petty families, complex, glacial moraines

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,110 to 9,150 feet
Mean annual precipitation: 20 to 47 inches
Frost-free period: 20 to 60 days

Component Description

Upsata and similar soils
Composition: 35 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,110 to 9,150 feet
Effective annual precipitation: 20 to 47 inches
Frost-free period: 20 to 60 days

Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Volcanic ash over till derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 13 inches; gravelly ashy silt loam
2E—13 to 20 inches; gravelly fine sandy loam
2E/Bw—20 to 60 inches; extremely gravelly loamy sand

Bata and similar soils
Composition: 25 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,110 to 9,150 feet
Effective annual precipitation: 20 to 47 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over till derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Petty and similar soils
Composition: 15 percent
Geomorphic description: Ground moraine
Slope: 10 to 40 percent
Elevation: 6,110 to 9,150 feet
Effective annual precipitation: 20 to 47 inches
Frost-free period: 20 to 60 days
Surface layer texture: Ashy silt loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Volcanic ash over till derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches

Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 5 inches; ashy silt loam
Bw1—5 to 10 inches; ashy silt loam
Bw2—10 to 14 inches; ashy silt loam
2Bw3—14 to 22 inches; very stony loam
2BC—22 to 31 inches; very cobbly loam
2C—31 to 60 inches; very cobbly sandy loam

Additional Components

Lowder and similar soils: 10 percent
Como and similar soils: 5 percent
Lilylake and similar soils: 5 percent
Rock outcrop: 5 percent

414A—Kilgore-Mooseflat-Water complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Elevation: 4,740 to 8,800 feet
Mean annual precipitation: 15 to 22 inches
Frost-free period: 30 to 70 days

Component Description

Kilgore and similar soils
Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,740 to 8,800 feet
Effective annual precipitation: 15 to 22 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy alluvium over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 4.5 inches
Typical profile:
OE—0 to 2 inches; moderately decomposed plant material
A—2 to 12 inches; loam
Ag—12 to 17 inches; loam
2Cg—17 to 60 inches; very gravelly sand

Mooseflat and similar soils
Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,740 to 8,800 feet
Effective annual precipitation: 15 to 22 inches

Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 4.8 inches
Typical profile:
OE—0 to 1 inches; moderately decomposed plant material
A—1 to 11 inches; loam
Bw—11 to 23 inches; loam
2C—23 to 60 inches; very cobbly sand

Water
Composition: 10 percent
Definition: Water includes streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.
Geomorphic description: None assigned

Additional Components

Dunkleber and similar soils: 5 percent
Foolhen and similar soils: 5 percent

467P—Elve-Gambler-Sebud families, complex, ice-margin slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,660 to 8,310 feet
Mean annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days

Component Description

Elve and similar soils
Composition: 40 percent
Geomorphic description: Ice-margin mountain slope
Slope: 0 to 20 percent
Elevation: 6,660 to 8,310 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium and/or till derived from quartzite
Native plant cover type: Forestland
Flooding: None

Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Gambler and similar soils
Composition: 20 percent
Geomorphic description: Ice-margin mountain slope
Slope: 0 to 20 percent
Elevation: 6,660 to 8,310 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium and/or till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.1 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 14 inches; loam
E/Bt1—14 to 22 inches; gravelly clay loam
E/Bt2—22 to 60 inches; very cobbly clay loam

Sebud and similar soils
Composition: 20 percent
Geomorphic description: Ice-margin mountain slope
Slope: 0 to 20 percent
Elevation: 6,660 to 8,310 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Cobbly loam
Rock fragments on the soil surface: 0 to 3 percent boulders
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium and/or till derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 4 inches; cobbly loam
A2—4 to 11 inches; very stony sandy loam
Bw1—11 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Additional Components

Libeg and similar soils: 10 percent
Philipsburg and similar soils: 10 percent

521S—Elkner-Garlet families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,540 to 9,450 feet
Mean annual precipitation: 21 to 41 inches
Frost-free period: 20 to 60 days

Component Description

Elkner and similar soils
Composition: 60 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,550 to 9,450 feet
Effective annual precipitation: 21 to 41 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E1—3 to 10 inches; stony sandy loam
E2—10 to 19 inches; stony sandy loam
E&Bt—19 to 39 inches; gravelly coarse sandy loam
BC—39 to 60 inches; stony loamy coarse sand

Garlet and similar soils
Composition: 25 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,550 to 9,450 feet
Effective annual precipitation: 21 to 41 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
Bk—49 to 60 inches; very flaggy sandy loam

Additional Components

Comad and similar soils: 10 percent
Rock outcrop: 5 percent

527P—Howardsville-Elve-Libeg families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,920 to 8,940 feet
Mean annual precipitation: 18 to 35 inches
Frost-free period: 30 to 60 days

Component Description

Howardsville and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 5,920 to 8,940 feet
Effective annual precipitation: 18 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Elve and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 5,920 to 8,940 feet
Effective annual precipitation: 18 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches

Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Libeg and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 5,920 to 8,940 feet
Effective annual precipitation: 18 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.0 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 11 inches; very cobbly sandy loam
Bt1—11 to 16 inches; very channery loam
Bt2—16 to 30 inches; very channery clay loam
BC—30 to 60 inches; very cobbly sandy loam

Additional Components

Gambler and similar soils: 10 percent
Sebud and similar soils: 10 percent

527S—Garlet-Worock-Como families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,120 to 9,290 feet
Mean annual precipitation: 16 to 35 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,120 to 9,290 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Worock and similar soils
Composition: 25 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,120 to 9,290 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 13 inches; stony loam
Bt—13 to 55 inches; very gravelly clay loam
BC—55 to 60 inches; very gravelly loam

Como and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,120 to 9,290 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Additional Components

Relyea and similar soils: 10 percent
Rubble land: 5 percent

527Sa—Bata-Holloway-Garlet families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,710 to 9,020 feet
Mean annual precipitation: 23 to 41 inches
Frost-free period: 30 to 60 days

Component Description

Bata and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,710 to 9,020 feet
Effective annual precipitation: 23 to 41 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Holloway and similar soils
Composition: 30 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,710 to 9,020 feet
Effective annual precipitation: 23 to 41 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.5 inches

Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 13 inches; gravelly ashy silt loam
2E—13 to 20 inches; extremely gravelly loam
2E&Bt—20 to 55 inches; extremely gravelly loam
2C—55 to 60 inches; extremely gravelly loam

Garlet and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,710 to 9,020 feet
Effective annual precipitation: 23 to 41 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Additional Components

Como and similar soils: 10 percent

527X—Elve-Libeg-Sebud families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,260 to 8,690 feet
Mean annual precipitation: 20 to 33 inches
Frost-free period: 30 to 70 days

Component Description

Elve and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,260 to 8,690 feet
Effective annual precipitation: 20 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly sandy loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Libeg and similar soils
Composition: 25 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,260 to 8,690 feet
Effective annual precipitation: 20 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A—0 to 10 inches; very cobbly sandy loam
Bt1—10 to 16 inches; very channery loam
Bt2—16 to 30 inches; very channery clay loam
BC—30 to 60 inches; very cobbly sandy loam

Sebud and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,260 to 8,690 feet
Effective annual precipitation: 20 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches
Typical profile:
A1—0 to 4 inches; cobbly loam
A2—4 to 10 inches; very stony sandy loam
Bw1—10 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Additional Components

Gambler and similar soils: 10 percent
Howardsville and similar soils: 5 percent

528P—Tepecreek-Comad-Libeg families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,190 to 7,760 feet
Mean annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days

Component Description

Tepecreek and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,190 to 7,760 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very gravelly sandy clay loam
Depth to restrictive feature:
- Paralithic bedrock: 20 to 40 inches
- Lithic bedrock: 30 to 60 inches

Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.6 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 10 inches; very gravelly sandy clay loam
Bt—10 to 20 inches; very gravelly sandy clay loam
BC—20 to 37 inches; very gravelly coarse sandy loam
Cr—37 to 54 inches; bedrock
R—54 to 60 inches; bedrock

Comad and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,190 to 7,760 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Stony loamy sand
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland

Flooding: None
Available water capacity: Mainly 1.4 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E1—1 to 6 inches; stony loamy sand
E2—6 to 18 inches; very stony sandy loam
E&Bt1—18 to 31 inches; very stony loamy sand
E&Bt2—31 to 60 inches; very stony loamy sand

Libeg and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,190 to 7,760 feet
Effective annual precipitation: 16 to 35 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.3 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 11 inches; very cobbly sandy loam
Bt—11 to 22 inches; very channery loam
BC—22 to 60 inches; very cobbly sandy loam

Additional Components

Bearmouth and similar soils: 10 percent
Rock outcrop: 10 percent

528Sa—Petty-Como-Bata families, complex, gentle mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,300 to 9,750 feet
Mean annual precipitation: 21 to 47 inches
Frost-free period: 30 to 60 days

Component Description

Petty and similar soils
Composition: 40 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,300 to 9,750 feet
Effective annual precipitation: 21 to 47 inches
Frost-free period: 30 to 60 days

Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Volcanic ash over colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 5 inches; ashy silt loam
Bw1—5 to 10 inches; ashy silt loam
Bw2—10 to 14 inches; ashy silt loam
2Bw3—14 to 22 inches; very stony loam
2BC—22 to 31 inches; very cobbly loam
2C—31 to 60 inches; very cobbly sandy loam

Como and similar soils
Composition: 30 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,300 to 9,750 feet
Effective annual precipitation: 21 to 47 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Bata and similar soils
Composition: 20 percent
Geomorphic description: Gentle mountain slope
Slope: 0 to 20 percent
Elevation: 6,300 to 9,750 feet
Effective annual precipitation: 21 to 47 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam

2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Additional Components

Garlet and similar soils: 10 percent

531S—Como-Garlet families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,090 to 9,460 feet
Mean annual precipitation: 18 to 49 inches
Frost-free period: 20 to 60 days

Component Description

Como and similar soils
Composition: 40 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,090 to 9,460 feet
Effective annual precipitation: 18 to 49 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Garlet and similar soils
Composition: 40 percent
Geomorphic description: Moderately steep mountain slope
Slope: 45 to 70 percent
Elevation: 6,090 to 9,460 feet
Effective annual precipitation: 18 to 49 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches

Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
Bk—49 to 60 inches; very flaggy sandy loam

Additional Components

Elkner and similar soils: 10 percent
Rock outcrop: 10 percent

537P—Elve-Gambler-Libeg families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,860 to 9,030 feet
Mean annual precipitation: 18 to 37 inches
Frost-free period: 30 to 60 days

Component Description

Elve and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,860 to 9,030 feet
Effective annual precipitation: 18 to 37 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Gambler and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,860 to 9,030 feet
Effective annual precipitation: 18 to 37 inches
Frost-free period: 30 to 60 days
Surface layer texture: Loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.1 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 14 inches; loam
E/Bt1—14 to 22 inches; gravelly clay loam
E/Bt2—22 to 60 inches; very cobbly clay loam

Libeg and similar soils
Composition: 20 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,860 to 9,030 feet
Effective annual precipitation: 18 to 37 inches
Frost-free period: 30 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 11 inches; stony loam
Bt—11 to 29 inches; very stony sandy clay loam
BC—29 to 60 inches; very cobbly sandy loam

Additional Components

Loberg and similar soils: 10 percent
Sebud and similar soils: 10 percent

537S—Garlet-Worock-Como families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,940 to 9,320 feet
Mean annual precipitation: 15 to 43 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 50 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent

Elevation: 5,940 to 9,320 feet
Effective annual precipitation: 15 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Worock and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,940 to 9,320 feet
Effective annual precipitation: 15 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 13 inches; stony loam
Bt—13 to 55 inches; very gravelly clay loam
BC—55 to 60 inches; very gravelly loam

Como and similar soils
Composition: 20 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,940 to 9,320 feet
Effective annual precipitation: 15 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam

BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

537Sa—Garlet-Holloway-Bata families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,320 to 9,360 feet
Mean annual precipitation: 23 to 43 inches
Frost-free period: 30 to 60 days

Component Description

Garlet and similar soils
Composition: 45 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 40 percent
Elevation: 6,320 to 9,360 feet
Effective annual precipitation: 23 to 43 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Holloway and similar soils
Composition: 25 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 40 percent
Elevation: 6,320 to 9,360 feet
Effective annual precipitation: 23 to 43 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.5 inches

Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 13 inches; gravelly ashy silt loam
2E—13 to 20 inches; extremely gravelly loam
2E&Bt—20 to 55 inches; extremely gravelly loam
2C—55 to 60 inches; extremely gravelly loam

Bata and similar soils
Composition: 20 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 40 percent
Elevation: 6,320 to 9,360 feet
Effective annual precipitation: 23 to 43 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Additional Components

Como and similar soils: 10 percent

537X—Elve-Sebud families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,080 to 8,950 feet
Mean annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days

Component Description

Elve and similar soils
Composition: 45 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,080 to 8,950 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days
Surface layer texture: Very gravelly sandy loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; very gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Sebud and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,080 to 8,950 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
A1—0 to 6 inches; cobbly loam
A2—6 to 13 inches; very stony sandy loam
Bw—13 to 60 inches; very stony sandy loam

Additional Components

Libeg and similar soils: 10 percent
Rock outcrop: 10 percent
Philipsburg and similar soils: 5 percent

538P—Howardsville-Sebud-Libeg families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,950 to 7,960 feet
Mean annual precipitation: 15 to 38 inches
Frost-free period: 30 to 60 days

Component Description

Howardsville and similar soils
Composition: 40 percent
Geomorphic description: Moderately steep mountain slope

Slope: 20 to 45 percent
Elevation: 5,950 to 7,960 feet
Effective annual precipitation: 15 to 38 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Sebud and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,950 to 7,960 feet
Effective annual precipitation: 15 to 38 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very stony sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 4 inches; very stony sandy loam
A2—4 to 11 inches; very stony sandy loam
Bw1—11 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Libeg and similar soils
Composition: 15 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,950 to 7,960 feet
Effective annual precipitation: 15 to 38 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.3 inches

Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 11 inches; very cobbly sandy loam
Bt—11 to 22 inches; very channery loam
BC—22 to 60 inches; very cobbly sandy loam

Additional Components

Tepecreek and similar soils: 10 percent
Rock outcrop: 5 percent

538S—Como-Comad-Garlet families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,980 to 9,450 feet
Mean annual precipitation: 15 to 39 inches
Frost-free period: 20 to 60 days

Component Description

Como and similar soils
Composition: 40 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,980 to 9,450 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Comad and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,980 to 9,450 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 20 to 60 days
Surface layer texture: Very stony sandy loam
Depth to restrictive feature: None noted
Drainage class: Excessively drained

Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.4 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E1—1 to 6 inches; very stony sandy loam
E2—6 to 18 inches; very stony sandy loam
E&Bt1—18 to 31 inches; very stony loamy sand
E&Bt2—31 to 60 inches; very stony loamy sand

Garlet and similar soils
Composition: 15 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 5,980 to 9,450 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Additional Components

Worock and similar soils: 10 percent
Rock outcrop: 5 percent

538Sa—Como-Petty families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,220 to 9,250 feet
Mean annual precipitation: 20 to 45 inches
Frost-free period: 30 to 60 days

Component Description

Como and similar soils
Composition: 55 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent

Elevation: 6,220 to 9,250 feet
Effective annual precipitation: 20 to 45 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Petty and similar soils
Composition: 35 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,220 to 9,250 feet
Effective annual precipitation: 20 to 45 inches
Frost-free period: 30 to 60 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Volcanic ash over colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 5 inches; ashy silt loam
Bw1—5 to 10 inches; ashy silt loam
Bw2—10 to 14 inches; ashy silt loam
2Bw3—14 to 22 inches; very stony loam
2BC—22 to 31 inches; very cobbly loam
2C—31 to 60 inches; very cobbly sandy loam

Additional Components

Garlet and similar soils: 10 percent

538X—Bearmouth-Gateview-Howardsville families, complex, moderately steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,020 to 9,010 feet
Mean annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days

Component Description

Bearmouth and similar soils
Composition: 40 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,020 to 9,010 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; very cobbly loam
Bw—8 to 15 inches; very cobbly sandy loam
C—15 to 60 inches; very cobbly loamy sand

Gateview and similar soils
Composition: 30 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,020 to 9,010 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.4 inches
Typical profile:
A1—0 to 18 inches; gravelly loam
A2—18 to 42 inches; very gravelly loam
2C—42 to 60 inches; very cobbly sand

Howardsville and similar soils
Composition: 20 percent
Geomorphic description: Moderately steep mountain slope
Slope: 20 to 45 percent
Elevation: 6,020 to 9,010 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches

Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Additional Components

Rock outcrop: 5 percent
Tepecreek and similar soils: 5 percent

541S—Como-Garlet-Elkner families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,940 to 9,750 feet
Mean annual precipitation: 18 to 45 inches
Frost-free period: 30 to 60 days

Component Description

Como and similar soils
Composition: 40 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,940 to 9,750 feet
Effective annual precipitation: 18 to 45 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Garlet and similar soils
Composition: 30 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,940 to 9,750 feet
Effective annual precipitation: 18 to 45 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained

Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
Bk—49 to 60 inches; very flaggy sandy loam

Elkner and similar soils
Composition: 20 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,940 to 9,750 feet
Effective annual precipitation: 18 to 45 inches
Frost-free period: 30 to 60 days
Surface layer texture: Stony sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from gneiss
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E1—3 to 10 inches; stony sandy loam
E2—10 to 19 inches; stony sandy loam
E&Bt—19 to 39 inches; gravelly coarse sandy loam
BC—39 to 60 inches; stony loamy coarse sand

Additional Components

Rock outcrop: 10 percent

546S—Whitore-Helmville families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,220 to 9,480 feet
Mean annual precipitation: 16 to 45 inches
Frost-free period: 20 to 60 days

Component Description

Whitore and similar soils
Composition: 50 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 6,220 to 9,480 feet

Effective annual precipitation: 16 to 45 inches
Frost-free period: 20 to 60 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from limestone
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.9 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 9 inches; cobbly loam
Bw—9 to 19 inches; cobbly loam
Bk—19 to 60 inches; very cobbly loam

Helmville and similar soils
Composition: 40 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 6,220 to 9,480 feet
Effective annual precipitation: 16 to 45 inches
Frost-free period: 20 to 60 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from limestone
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 11 inches; cobbly loam
Bt1—11 to 15 inches; very cobbly clay loam
Bt2—15 to 26 inches; very cobbly clay loam
Bk—26 to 60 inches; very gravelly clay loam

Additional Components

Rock outcrop: 10 percent

547P—Elve-Gambler-Sebud families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,760 to 8,960 feet
Mean annual precipitation: 17 to 33 inches
Frost-free period: 30 to 60 days

Component Description

Elve and similar soils
Composition: 30 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,760 to 8,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; very gravelly loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Gambler and similar soils
Composition: 30 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,760 to 8,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 60 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 6.1 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 14 inches; loam
E/Bt1—14 to 22 inches; gravelly clay loam
E/Bt2—22 to 60 inches; very cobbly clay loam

Sebud and similar soils
Composition: 20 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,760 to 8,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland

Flooding: None
Available water capacity: Mainly 3.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A1—1 to 4 inches; stony loam
A2—4 to 11 inches; very stony sandy loam
Bw1—11 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Additional Components

Libeg and similar soils: 10 percent
Rock outcrop: 10 percent

547S—Garlet-Como-Worock families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,970 to 9,380 feet
Mean annual precipitation: 16 to 43 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 50 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,970 to 9,380 feet
Effective annual precipitation: 16 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Como and similar soils
Composition: 20 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,970 to 9,380 feet
Effective annual precipitation: 16 to 43 inches

Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Worock and similar soils
Composition: 20 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,970 to 9,380 feet
Effective annual precipitation: 16 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 13 inches; stony loam
Bt—13 to 55 inches; very gravelly clay loam
BC—55 to 60 inches; very gravelly loam

Additional Components

Rock outcrop: 10 percent

547X—Bearmouth-Elve families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,890 to 8,880 feet
Mean annual precipitation: 17 to 36 inches
Frost-free period: 30 to 70 days

Component Description

Bearmouth and similar soils
Composition: 40 percent
Geomorphic description: Steep mountain slope

Slope: 45 to 70 percent
Elevation: 5,890 to 8,880 feet
Effective annual precipitation: 17 to 36 inches
Frost-free period: 30 to 70 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.3 inches
Typical profile:
A—0 to 7 inches; very cobbly loam
Bw—7 to 14 inches; very cobbly sandy loam
C—14 to 60 inches; very cobbly loamy sand

Elve and similar soils
Composition: 35 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,890 to 8,880 feet
Effective annual precipitation: 17 to 36 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Additional Components

Howardsville and similar soils: 10 percent
Libeg and similar soils: 10 percent
Rock outcrop: 5 percent

548P—Tepecreek-Ellena-Libeg families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,950 to 8,760 feet
Mean annual precipitation: 17 to 31 inches
Frost-free period: 30 to 60 days

Component Description

Tepecreek and similar soils
Composition: 35 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,950 to 8,760 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very gravelly sandy clay loam
Depth to restrictive feature:
- Paralithic bedrock: 20 to 40 inches
- Lithic bedrock: 30 to 60 inches

Drainage class: Well drained
Parent material: Colluvium over residuum weathered from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.6 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 10 inches; very gravelly sandy clay loam
Bt—10 to 20 inches; very gravelly sandy clay loam
BC—20 to 37 inches; very gravelly coarse sandy loam
Cr—37 to 54 inches; bedrock
R—54 to 60 inches; bedrock

Ellena and similar soils
Composition: 30 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,950 to 8,760 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.8 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E1—1 to 10 inches; very cobbly sandy loam
E2—10 to 22 inches; very cobbly coarse sandy loam
E/Bw—22 to 27 inches; very cobbly coarse sandy loam
Cr—27 to 60 inches; bedrock

Libeg and similar soils
Composition: 20 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,950 to 8,760 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 60 days
Surface layer texture: Gravelly sandy loam

Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.6 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 11 inches; gravelly sandy loam
Bt1—11 to 16 inches; very flaggy loam
Bt2—16 to 30 inches; very flaggy clay loam
BC—30 to 60 inches; very cobbly sandy loam

Additional Components

Comad and similar soils: 10 percent
Rock outcrop: 5 percent

548S—Comad-Como-Targhee families, complex, steep mountain slopes

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,980 to 9,550 feet
Mean annual precipitation: 20 to 37 inches
Frost-free period: 20 to 60 days

Component Description

Comad and similar soils
Composition: 30 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,980 to 9,550 feet
Effective annual precipitation: 20 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Very stony sandy loam
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.4 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E1—1 to 6 inches; very stony sandy loam
E2—6 to 18 inches; very stony sandy loam
E&Bt1—18 to 31 inches; very stony loamy sand
E&Bt2—31 to 60 inches; very stony loamy sand

Como and similar soils
Composition: 25 percent

Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,980 to 9,550 feet
Effective annual precipitation: 20 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Colluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Targhee and similar soils
Composition: 25 percent
Geomorphic description: Steep mountain slope
Slope: 45 to 70 percent
Elevation: 5,980 to 9,550 feet
Effective annual precipitation: 20 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Very cobbly sandy loam
Depth to restrictive feature: Paralithic bedrock: 20 to 40 inches
Drainage class: Somewhat excessively drained
Parent material: Colluvium over residuum weathered from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 1.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E1—1 to 9 inches; very cobbly sandy loam
E2—9 to 21 inches; very cobbly coarse sandy loam
E/Bw—21 to 26 inches; very cobbly coarse sandy loam
Cr—26 to 60 inches; bedrock

Additional Components

Garlet and similar soils: 10 percent
Rock outcrop: 5 percent
Rubble land: 5 percent

613G—Adel-Dunkleber-Wetopa families, complex, alluvial-colluvial deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,210 to 7,960 feet

Mean annual precipitation: 17 to 33 inches
Frost-free period: 30 to 70 days

Component Description

Adel and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,210 to 7,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from conglomerate and/or sandstone and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.7 inches
Typical profile:
A1—0 to 9 inches; loam
A2—9 to 32 inches; loam
Bw—32 to 60 inches; gravelly loam

Dunkleber and similar soils
Composition: 25 percent
Geomorphic description: Drainageway; fan remnant
Slope: 0 to 10 percent
Elevation: 6,210 to 7,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Mucky peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Organic material over alluvium derived from sandstone and shale and/or conglomerate
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.3 inches
Typical profile:
Oi1—0 to 12 inches; mucky peat
Oi2—12 to 52 inches; mucky peat
2C—52 to 60 inches; loam

Wetopa and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,210 to 7,960 feet
Effective annual precipitation: 17 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Clay loam
Depth to restrictive feature: None noted
Drainage class: Well drained

Parent material: Alluvium derived from conglomerate and/or sandstone and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 9.6 inches
Typical profile:
A—0 to 10 inches; clay loam
Bt—10 to 34 inches; clay
BC—34 to 60 inches; clay loam

Additional Components

Lowder and similar soils: 10 percent
Mooseflat and similar soils: 5 percent
Philipsburg and similar soils: 5 percent
Woodhurst and similar soils: 5 percent

613P—Maciver-Philipsburg-Dunkleber families, complex, alluvial-colluvial deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,370 to 8,430 feet
Mean annual precipitation: 13 to 33 inches
Frost-free period: 30 to 70 days

Component Description

Maciver and similar soils
Composition: 55 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,370 to 8,430 feet
Effective annual precipitation: 13 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from conglomerate and/or sandstone and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; loam
Bt—8 to 12 inches; very gravelly clay loam
Bk—12 to 60 inches; very gravelly loam

Philipsburg and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,370 to 8,430 feet

Effective annual precipitation: 13 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from conglomerate and/or sandstone and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 8.1 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; loam
Bt—8 to 20 inches; gravelly clay loam
Bk—20 to 60 inches; gravelly loam

Dunkleber and similar soils
Composition: 15 percent
Geomorphic description: Drainageway; fan remnant
Slope: 0 to 10 percent
Elevation: 6,370 to 8,430 feet
Effective annual precipitation: 13 to 33 inches
Frost-free period: 30 to 70 days
Surface layer texture: Mucky peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Organic material over alluvium derived from sandstone and shale and/or conglomerate
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.3 inches
Typical profile:
Oi1—0 to 12 inches; mucky peat
Oi2—12 to 52 inches; mucky peat
2C—52 to 60 inches; loam

Additional Components

Rooset and similar soils: 10 percent

617G—Libeg-Finn-Sebud families, complex, alluvial-colluvial deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,010 to 9,070 feet
Mean annual precipitation: 15 to 39 inches
Frost-free period: 30 to 60 days

Component Description

Libeg and similar soils
Composition: 35 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,010 to 9,070 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.3 inches
Typical profile:
A—0 to 10 inches; very cobbly loam
Bt1—10 to 16 inches; very channery loam
Bt2—16 to 30 inches; very channery sandy clay loam
BC—30 to 60 inches; very cobbly sandy loam

Finn and similar soils
Composition: 20 percent
Geomorphic description: Drainageway; fan remnant
Slope: 0 to 10 percent
Elevation: 6,010 to 9,070 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 30 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 4.0 inches
Typical profile:
Oi—0 to 2 inches; peat
A—2 to 10 inches; gravelly loam
Bw1—10 to 16 inches; very gravelly sandy loam
Bw2—16 to 22 inches; very gravelly sandy loam
C—22 to 60 inches; very cobbly sandy loam

Sebud and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,010 to 9,070 feet
Effective annual precipitation: 15 to 39 inches
Frost-free period: 30 to 60 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from quartzite

Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.9 inches
Typical profile:
A1—0 to 4 inches; cobbly loam
A2—4 to 10 inches; very stony sandy loam
Bw1—10 to 22 inches; very stony sandy loam
Bw2—22 to 60 inches; very stony sandy loam

Additional Components

Foolhen and similar soils: 10 percent
Bearmouth and similar soils: 5 percent
Bridger and similar soils: 5 percent
Lilylake and similar soils: 5 percent

617S—Garlet-Worock-Lowder families, complex, alluvial-colluvial deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,170 to 7,750 feet
Mean annual precipitation: 20 to 29 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 40 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,170 to 7,750 feet
Effective annual precipitation: 20 to 29 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium and/or colluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Worock and similar soils
Composition: 30 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent

Elevation: 6,170 to 7,750 feet
Effective annual precipitation: 20 to 29 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 13 inches; stony loam
Bt—13 to 55 inches; very gravelly clay loam
BC—55 to 60 inches; very gravelly loam

Lowder and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 6,170 to 7,750 feet
Effective annual precipitation: 20 to 29 inches
Frost-free period: 20 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 3.8 inches
Typical profile:
Oi—0 to 4 inches; peat
A—4 to 11 inches; very cobbly loam
Bg—11 to 37 inches; very gravelly sandy clay loam
BCg—37 to 60 inches; very gravelly sandy loam

Additional Components

Stecum and similar soils: 10 percent

618G—Dunkleber-Mooseflat-Wichup families, complex, alluvial-colluvial deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,060 to 8,760 feet
Mean annual precipitation: 16 to 43 inches
Frost-free period: 30 to 70 days

Component Description

Dunkleber and similar soils
Composition: 30 percent
Geomorphic description: Drainageway; fan remnant
Slope: 0 to 10 percent
Elevation: 6,060 to 8,760 feet
Effective annual precipitation: 16 to 43 inches
Frost-free period: 30 to 70 days
Surface layer texture: Mucky peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Organic material over alluvium derived from granite
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 1.3 inches
Typical profile:
Oi1—0 to 12 inches; mucky peat
Oi2—12 to 52 inches; mucky peat
2C—52 to 60 inches; loam

Mooseflat and similar soils
Composition: 25 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 6,060 to 8,760 feet
Effective annual precipitation: 16 to 43 inches
Frost-free period: 30 to 70 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; peat
A—2 to 10 inches; loam
Bg—10 to 22 inches; loam
2Cg—22 to 60 inches; very cobbly sand

Wichup and similar soils
Composition: 25 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 6,060 to 8,760 feet
Effective annual precipitation: 16 to 43 inches
Frost-free period: 30 to 70 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland

Flooding: Rare
Water table: Present
Available water capacity: Mainly 7.6 inches
Typical profile:
OE—0 to 12 inches; peat
A—12 to 24 inches; sandy loam
Bg—24 to 60 inches; gravelly sandy loam

Additional Components

Foolhen and similar soils: 10 percent
Lowder and similar soils: 10 percent

647G—Finn-Wander-Foolhen families, complex, valley bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,800 to 8,660 feet
Mean annual precipitation: 17 to 47 inches
Frost-free period: 30 to 60 days

Component Description

Finn and similar soils
Composition: 40 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,800 to 8,660 feet
Effective annual precipitation: 17 to 47 inches
Frost-free period: 30 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 4.0 inches
Typical profile:
Oi—0 to 2 inches; peat
A—2 to 10 inches; gravelly loam
Bw1—10 to 16 inches; very gravelly sandy loam
Bw2—16 to 22 inches; very gravelly sandy loam
C—22 to 60 inches; very cobbly sandy loam

Wander and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 5,800 to 8,660 feet
Effective annual precipitation: 17 to 47 inches

Frost-free period: 30 to 60 days
Surface layer texture: Very cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.3 inches
Typical profile:
A—0 to 6 inches; very cobbly loam
Bt1—6 to 16 inches; very channery loam
Bt2—16 to 30 inches; very channery sandy clay loam
BC—30 to 60 inches; very cobbly sandy loam

Foolhen and similar soils
Composition: 15 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,800 to 8,660 feet
Effective annual precipitation: 17 to 47 inches
Frost-free period: 30 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 9.4 inches
Typical profile:
Oi—0 to 1 inches; peat
A—1 to 8 inches; loam
Bg—8 to 18 inches; loam
Cg1—18 to 25 inches; loam
Cg2—25 to 60 inches; gravelly loam

Additional Components

Kamack and similar soils: 10 percent
Ledgefork and similar soils: 10 percent
Wichup and similar soils: 5 percent

647U—Garlet-Como-Lilylake families, complex, valley bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,880 to 7,850 feet
Mean annual precipitation: 15 to 37 inches
Frost-free period: 20 to 60 days

Component Description

Garlet and similar soils
Composition: 40 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 5,880 to 7,850 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from conglomerate
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 7 inches; gravelly loam
E/Bw—7 to 22 inches; very flaggy loam
Bw/E—22 to 49 inches; very flaggy sandy loam
BC—49 to 60 inches; very flaggy sandy loam

Como and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 5,880 to 7,850 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Lilylake and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,880 to 7,850 feet
Effective annual precipitation: 15 to 37 inches
Frost-free period: 20 to 60 days
Surface layer texture: Muck
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland

Flooding: Occasional
Water table: Present
Ponding duration: Brief
Available water capacity: Mainly 1.4 inches
Typical profile:
OA—0 to 12 inches; muck
C1—12 to 15 inches; gravelly coarse sand
C2—15 to 60 inches; extremely gravelly coarse sand

Additional Components

Elvick and similar soils: 10 percent
Lowder and similar soils: 10 percent

648G—Wichup-Mooseflat-Lowder families, complex, valley bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,490 to 7,920 feet
Mean annual precipitation: 15 to 41 inches
Frost-free period: 30 to 70 days

Component Description

Wichup and similar soils
Composition: 40 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,490 to 7,920 feet
Effective annual precipitation: 15 to 41 inches
Frost-free period: 30 to 70 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 7.6 inches
Typical profile:
OE—0 to 12 inches; peat
A—12 to 24 inches; sandy loam
Bg—24 to 60 inches; gravelly sandy loam

Mooseflat and similar soils
Composition: 30 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,490 to 7,920 feet
Effective annual precipitation: 15 to 41 inches
Frost-free period: 30 to 70 days

Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; peat
A—2 to 10 inches; loam
Bg—10 to 22 inches; loam
2Cg—22 to 60 inches; very cobbly sand

Lowder and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,490 to 7,920 feet
Effective annual precipitation: 15 to 41 inches
Frost-free period: 30 to 70 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 3.8 inches
Typical profile:
Oi—0 to 4 inches; peat
A—4 to 11 inches; very cobbly loam
Bg—11 to 37 inches; very gravelly sandy clay loam
BCg—37 to 60 inches; very gravelly sandy loam

Additional Components

Lilylake and similar soils: 10 percent

648U—Lowder-Lilylake-Como families, complex, valley bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,900 to 7,530 feet
Mean annual precipitation: 15 to 35 inches
Frost-free period: 20 to 60 days

Component Description

Lowder and similar soils
Composition: 40 percent

Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 5,900 to 7,530 feet
Effective annual precipitation: 15 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 3.8 inches
Typical profile:
Oi—0 to 4 inches; peat
A—4 to 11 inches; very cobbly loam
Bg—11 to 37 inches; very gravelly sandy clay loam
BCg—37 to 60 inches; very gravelly sandy loam

Lilylake and similar soils
Composition: 30 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 5,900 to 7,530 feet
Effective annual precipitation: 15 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Muck
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: Occasional
Water table: Present
Ponding duration: Brief
Available water capacity: Mainly 1.4 inches
Typical profile:
OA—0 to 12 inches; muck
C1—12 to 15 inches; gravelly coarse sand
C2—15 to 60 inches; extremely gravelly coarse sand

Como and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 5,900 to 7,530 feet
Effective annual precipitation: 15 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches

Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Additional Components

Elvick and similar soils: 10 percent

648Ua—Upsata-Como-Lowder families, complex, valley bottoms

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,200 to 7,850 feet
Mean annual precipitation: 19 to 43 inches
Frost-free period: 20 to 60 days

Component Description

Upsata and similar soils
Composition: 30 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 6,200 to 7,850 feet
Effective annual precipitation: 19 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Excessively drained
Parent material: Volcanic ash over alluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 13 inches; gravelly ashy silt loam
2E—13 to 20 inches; gravelly fine sandy loam
2E/Bw—20 to 60 inches; extremely gravelly loamy sand

Como and similar soils
Composition: 25 percent
Geomorphic description: Drainageway
Slope: 0 to 20 percent
Elevation: 6,200 to 7,850 feet
Effective annual precipitation: 19 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained

Parent material: Alluvium derived from granite
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.9 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
E—1 to 8 inches; gravelly sandy loam
BC—8 to 15 inches; very gravelly sandy loam
C—15 to 60 inches; very gravelly loamy sand

Lowder and similar soils
Composition: 20 percent
Geomorphic description: Drainageway
Slope: 0 to 10 percent
Elevation: 6,200 to 7,850 feet
Effective annual precipitation: 19 to 43 inches
Frost-free period: 20 to 60 days
Surface layer texture: Peat
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Alluvium derived from quartzite
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 3.8 inches
Typical profile:
Oi—0 to 4 inches; peat
A—4 to 11 inches; very cobbly loam
Bg—11 to 37 inches; very gravelly sandy clay loam
BCg—37 to 60 inches; very gravelly sandy loam

Additional Components

Bata and similar soils: 10 percent
Elvick and similar soils: 10 percent
Waldbillig and similar soils: 5 percent

683P—Maciver-Philipsburg-Tiban families, complex, alluvial fans

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,140 to 8,530 feet
Mean annual precipitation: 17 to 31 inches
Frost-free period: 30 to 70 days

Component Description

Maciver and similar soils
Composition: 30 percent
Geomorphic description: Alluvial fan
Slope: 0 to 20 percent

Elevation: 6,140 to 8,530 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; loam
Bt—8 to 12 inches; very gravelly clay loam
Bk—12 to 60 inches; very gravelly loam

Philipsburg and similar soils
Composition: 25 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,140 to 8,530 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.7 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; cobbly loam
Bt—8 to 20 inches; gravelly clay loam
Bk—20 to 60 inches; gravelly loam

Tiban and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 0 to 20 percent
Elevation: 6,140 to 8,530 feet
Effective annual precipitation: 17 to 31 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 8 inches; gravelly loam
Bw—8 to 13 inches; very cobbly loam

Bk1—13 to 23 inches; very cobbly loam
Bk2—23 to 60 inches; very cobbly loam

Additional Components

Bridger and similar soils: 10 percent
Elve and similar soils: 10 percent
Gambler and similar soils: 5 percent

683Sa—Bata-Petty-Worock families, complex, alluvial fans

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 6,170 to 7,990 feet
Mean annual precipitation: 20 to 35 inches
Frost-free period: 20 to 60 days

Component Description

Bata and similar soils
Composition: 40 percent
Geomorphic description: Alluvial fan
Slope: 5 to 40 percent
Elevation: 6,170 to 8,000 feet
Effective annual precipitation: 20 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Gravelly ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Volcanic ash over colluvium derived from shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.3 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 4 inches; gravelly ashy silt loam
Bw—4 to 12 inches; gravelly ashy silt loam
2E/Bt—12 to 23 inches; very gravelly sandy loam
2Bt—23 to 60 inches; very gravelly sandy clay loam

Petty and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 5 to 40 percent
Elevation: 6,170 to 8,000 feet
Effective annual precipitation: 20 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Ashy silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat excessively drained
Parent material: Volcanic ash over alluvium derived from shale

Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.8 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 5 inches; ashy silt loam
Bw1—5 to 10 inches; ashy silt loam
Bw2—10 to 14 inches; ashy silt loam
2Bw3—14 to 22 inches; very stony loam
2BC—22 to 31 inches; very cobbly loam
2C—31 to 60 inches; very cobbly sandy loam

Worock and similar soils
Composition: 20 percent
Geomorphic description: Fan remnant
Slope: 5 to 40 percent
Elevation: 6,170 to 8,000 feet
Effective annual precipitation: 20 to 35 inches
Frost-free period: 20 to 60 days
Surface layer texture: Stony loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium derived from shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 13 inches; stony loam
Bt—13 to 55 inches; very gravelly clay loam
BC—55 to 60 inches; very gravelly loam

Additional Components

Relyea and similar soils: 10 percent
Swifton and similar soils: 10 percent

704X—Yellowmule-Elve-Adel families, complex, landslide deposits

Map Unit Setting

Interpretive focus: Multiple-use forest
Field investigation intensity: Order 3
Landscape: Mountains
Elevation: 5,930 to 10,000 feet
Mean annual precipitation: 13 to 34 inches
Frost-free period: 30 to 70 days

Component Description

Yellowmule and similar soils
Composition: 30 percent
Geomorphic description: Landslide
Slope: 5 to 40 percent

Elevation: 5,930 to 10,000 feet
Effective annual precipitation: 13 to 34 inches
Frost-free period: 30 to 70 days
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Complex landslide deposits derived from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 7.1 inches
Typical profile:
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 11 inches; silty clay loam
Bt1—11 to 19 inches; clay
Bt2—19 to 48 inches; cobbly clay loam
BC—48 to 72 inches; very cobbly clay loam

Elve and similar soils
Composition: 25 percent
Geomorphic description: Landslide
Slope: 5 to 40 percent
Elevation: 5,930 to 10,000 feet
Effective annual precipitation: 13 to 34 inches
Frost-free period: 30 to 70 days
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Complex landslide deposits derived from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.7 inches
Typical profile:
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; gravelly sandy loam
E/B—6 to 21 inches; very flaggy sandy loam
B/E—21 to 48 inches; very flaggy sandy loam
BC—48 to 60 inches; very flaggy sandy loam

Adel and similar soils
Composition: 20 percent
Geomorphic description: Landslide
Slope: 5 to 40 percent
Elevation: 5,930 to 10,000 feet
Effective annual precipitation: 13 to 34 inches
Frost-free period: 30 to 70 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Parent material: Alluvium and/or complex landslide deposits over residuum weathered from limestone, sandstone, and shale
Native plant cover type: Forestland
Flooding: None

Available water capacity: Mainly 7.7 inches
Typical profile:
A1—0 to 9 inches; loam
A2—9 to 32 inches; loam
Bw—32 to 60 inches; gravelly loam

Additional Components

Loberg and similar soils: 10 percent
Philipsburg and similar soils: 10 percent
Tiban and similar soils: 5 percent

914A—Kilgore-Mooseflat complex, 0 to 2 percent slopes

Map Unit Setting

Field investigation intensity: Order 2
Landscape: Intermontane basin
Elevation: 5,900 to 6,650 feet
Mean annual precipitation: 15 to 22 inches
Frost-free period: 30 to 50 days

Component Description

Kilgore and similar soils
Composition: 45 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,650 feet
Effective annual precipitation: 15 to 22 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 4.5 inches
Typical profile:
OE—0 to 2 inches; moderately decomposed plant material
A—2 to 12 inches; loam
Ag—12 to 17 inches; loam
2Cg—17 to 60 inches; very gravelly sand

Mooseflat and similar soils
Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 5,900 to 6,650 feet
Effective annual precipitation: 15 to 22 inches
Frost-free period: 30 to 50 days
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium

Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 5.5 inches
Typical profile:
OE—0 to 4 inches; moderately decomposed plant material
A—4 to 14 inches; loam
Cg1—14 to 19 inches; silt loam
Cg2—19 to 25 inches; gravelly loam
2Cg3—25 to 60 inches; extremely cobbly loamy sand

Additional Components

Foolhen and similar soils: 10 percent
Finn and similar soils: 5 percent

DA—Denied access

Component Description

Denied Access
Composition: 100 percent
Geomorphic description: None assigned

GP—Gravel pit

Component Description

Pits, gravel
Composition: 100 percent
Geomorphic description: None assigned

W—Water

Component Description

Water
Composition: 100 percent
Geomorphic description: None assigned

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to coordinate land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on soil physical properties, chemical properties, related site observations, and other factors that affect various soil uses and management. Field experience and collected performance data are used as a basis in predicting soil behavior.

Information in this section can be used to plan the management of soils as rangeland and forestland; as sites for parks and other recreational facilities; sources of construction materials; and establishment of ponds and embankments. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, camp areas, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are in both text and numerical format.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited*, and *unsuited* or as *good, fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations

appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

General Land Access and Management

The table “Hazard of Erosion and Suitability for Roads and Trails” shows interpretive ratings related to hazard of erosion (disturbed site), hazard of erosion on roads and trails, and suitability for roads (natural surface), The ratings in the table are in both text and numerical format.

Ratings in the column *hazard of erosion (disturbed site)* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, the roads or trails may require occasional maintenance, and simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

The table “Soil Damage by Fire, Fencing Limitations, and Soil Rutting Hazard” shows interpretive ratings related to potential for damage to soil by fire, fencing limitations, and soil rutting hazard. The ratings in the table are in both text and numerical format.

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Rating class terms for fire damage are expressed as *low, moderate*, and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage is highest (1.00) and the point at which the potential is lowest (0.00).

Rating class terms for *fencing limitations* are based on soil texture, flooding frequency, depth to bedrock, coarse fragments, shrink swell potential, slope, depth to water table, potential frost action, salinity, ponding, depth to cemented pan, and surface rock fragments. The soils are described as being very limited, limited, and not limited. The ratings indicate an evaluation of the limitation of the soil for installing fencing, typically driven, or dug, wooden or steel posts.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Agronomy

Richard Fasching, Montana State Agronomist, Natural Resources Conservation Service, prepared this section.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

The Big Hole Area—Part of Beaverhead County soil survey contains a very limited amount of cropland. The primary land use for tilled acreage is pasture or hayland. Acreage that is cropped is done so for purposes of reestablishing pasture or hayland. Crop/forage is predominantly flood irrigated. Do to the lack of flood-irrigation efficiencies, many "dryland" acres are characteristically artificially subirrigated where the water table rises during the growing season due to overirrigation of adjacent lands. The main pasture forage species include Garrison creeping foxtail and an assortment of other grasses adapted to cool temperatures and high elevations.

The primary concerns on irrigated cropland are employing proper irrigation water management, weed control, fertilization, and selecting crop varieties. Proper irrigation water management, which involves applying water at the optimum time and in adequate amounts, reduces problems associated with overirrigation, including loss of nutrients and short forage stand life. Proper techniques for irrigation water management help maintain higher production levels.

Wet soils are mainly used for hay production and pasture. Garrison creeping foxtail meadow produces excellent forage under these conditions.

Little dryland farming is undertaken because of the short growing season and marginal growing-season rainfall. Irrigation in this area is applied primarily by surface flooding methods. Forage production is used mainly to support the large number of cattle in the valley.

Pasture and hayland areas could be improved by reestablishing the desired grasses and legumes. Reestablishment is generally done by growing small grains for 1 to 2 years then planting the area back to permanent cover for 5 to 12 years. Weed control and proper grazing insure that desired plant species are maintained.

Subirrigated meadows are used for wintering cattle and for early spring grazing. These areas are primarily native grasses or Garrison creeping foxtail meadows. Deteriorated stands may be reestablished or renovated by proper grazing, fertilization, or establishment of early season pasture.

Cropland Management

Management concerns affecting the use of the detailed soil map units in the survey area for constructing grassed waterways, vegetating grassed waterways and filter strips, and installing sprinkler irrigation are shown in the table, “Cropland Management.”

A *grassed waterway* is a natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. The grassed waterway conducts surface water away from cropland.

A *filter strip* is a vegetated strip typically less than 50-feet wide, seeded to grass or a mixture of grass and legumes, to remove sediment, nutrients, and bacteria, concentrated in runoff from adjacent cropland or feed lots.

Sprinkler irrigation is a method to apply water to soils to assist in the production of crops. Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 2007a)

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or

cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1, there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in the table, "Land Capability and Yields per Acre of Crops and Pasture." The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Rangeland

Barbara Landgraf-Gibbons, Rangeland Management Specialist, Natural Resources Conservation Service, prepared this section.

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Rangeland is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed forestland is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Naturalized pasture is defined as forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

The table "Rangeland Ecological Sites and Forest Habitat Types with Production" at the end of this section shows, for each soil that supports vegetation suitable for grazing, the map unit symbol and soil name, and the ecological site name or habitat type. Explanation of the column headings in this table follows.

Ecological site ID, as linked in the Ecological Site Information System (ESIS), is used to identify a unique ecological site. ESIS data is available through the NRCS at http://esis.sc.egov.usda.gov/ or through the web soil survey at http://websoilsurvey.nrcs.usda.gov/app/. An ecological site is assigned a number, e.g., R043BF036MT, based on a five-part system.

R043BF036MT	*R* stands for *rangeland*
R**043**BF036MT	Three-digit number = Major Land Resource Area (MLRA)
R043**B**F036MT	Single letter = MLRA subdivision
R043B**F**036MT	Single letter = Land Resource Unit (LRU)
R043BF**036**MT	Three-digit site number—001 through 999—assigned to each site alphabetically, regardless of the MLRA or LRU designation (e.g., Clayey is always 001; Loamy is always 032; etc.).
R043BF036**MT**	State abbreviation for Montana

MLRAs are geographically associated LRUs (USDA, 2006a; USDA, 2006c). Identification of these large areas is important in statewide agricultural planning and has value in interstate, regional, and national planning.

LRUs are the basic units from which MLRAs are determined. LRUs are also the basic units for state land resource maps and are typically coextensive with state general soil map units. However, some general soil map units are subdivided into LRUs because of significant geographic differences in climate, water resources, or land use.

MLRAs and the associated LRUs are the basic units for delineating statewide patterns of soils, climate, water resources, and land use. Elevation, topography, and rainfall (effective amount, timing, kind, and distribution) have been the primary factors used to delineate these LRUs in Montana, because of their affect on potential native plant communities, land uses, and water resources.

MLRA and LRU information specific to this soil survey:

MLRA 43B—Central Rocky Mountains and LRU F

Soil Moisture Regimes	Ustic, moist, representative value of effective annual precipitation (inches) =19-22"
Soil Temperature Regimes	Cryic, representative value for the range of frost-free days (>32 Degrees F) = 30-50 days
Dominant Geological Resources	Limestone, granitics, argillite, quartzite, volcanics, tuffs, sedimentary rocks, alpine glaciation
Precipitation Timing	Approximately 45 percent of the total precipitation falls during the growing season (May, June, and July). The climate influence is continental, not maritime.
Major Vegetation	Many of the lands in this MLRA are forested, but there is also a significant extent of grasslands and grassland/ shrubland mixes. Typical vegetation includes Douglas-fir, subalpine fir, bluebunch wheatgrass, needlegrasses, Idaho and rough fescues, several sagebrush species, rabbitbrush, and other shrubs and forbs.

MLRA 44B—Central Rocky Mountain Valleys and LRU C

Soil Moisture Regimes	Ustic, representative value of effective annual precipitation (inches) = 14-19"
Soil Temperature Regimes	Cryic, representative value for the range of frost-free days (>32 Degrees F) = <50 days
Dominant Geological Resources	Tertiary valley fill and recent alluvium (plus miscellaneous glacial outwash) parent material
Precipitation Timing	Approximately 50-60 percent of the total precipitation falls during the growing season (May, June, and July).
Major Vegetation	Bluebunch wheatgrass, rough fescue, Idaho fescue, bearded wheatgrass, and scattered Douglas-fir in isolated areas.

When characteristics do not differ significantly among the LRUs within the MLRA, the LRU designation for the ecological site is Y.

MLRA 43B—Central Rocky Mountains and LRU Y

Soil Moisture Regimes	Aquic or Ubiquitous, representative value of effective annual precipitation (inches) = 12-80"
Soil Temperature Regimes	Any, representative value for the range of frost-free days (>32 Degrees F) = <50
Dominant Geological Resources	Limestone, granitics, argillite, quartzite, volcanics, tuffs, sedimentary rocks, alpine glaciation
Precipitation Timing	Approximately 45 percent of the total precipitation falls during the growing season (May, June, and July). The climate influence is continental, not maritime.
Major Vegetation	Any

MLRA 44B—Central Rocky Mountain Valleys and LRU Y

Soil Moisture Regimes	Aquic or Ubiquitous, representative value of effective annual precipitation (inches) = 10-22"
Soil Temperature Regimes	Any, representative value for the range of frost-free days (>32 Degrees F) = <70
Dominant Geological Resources	Tertiary valley fill and recent alluvium (plus miscellaneous glacial outwash) parent material
Precipitation Timing	Approximately 50-60 percent of the total precipitation falls during the growing season (May, June, and July).
Major Vegetation	Any

The *ecological site name* correlates with the ecological site ID. When no ecological site name is assigned, the habitat type may be used.

Habitat types, where used, are tagged with *(HP)* for wetland habitat types (Hansen, 1995), (*PK)* for forestland habitat types (Pfister, 1977), and (*MS)* for sagebrush/grass habitat types (Mueggler, 1980).

Rangeland Similarity Index

Rangeland Similarity Index is determined by comparing the present plant community with the potential natural plant community (known as the historic climax plant community) on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the similarity index. The historic climax plant community is the plant community that was best adapted to an ecological site and is considered to be the community existing in a natural equilibrium with the historic climatic, biotic, and abiotic factors on an ecological site.

Similarity index is determined to provide a basis for describing the extent of change that has occurred on an ecological site. Comparing the present plant community to the historic climax plant community describes the percent of the historic climax plant community remaining on a site. This information assists land managers in setting resources goals and evaluating the effect of current management. Detailed information regarding historic climax plant community plant species composition for determining similarity index can be found in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service and on-line at http://www.nrcs.usda.gov/technical/efotg/.

A variety of factors can affect similarity index. Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed. A very severe disturbance may destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weed-like plants, can invade. If the plant community has not deteriorated significantly, it eventually can return to dominantly natural plants if proper

grazing management is applied. If the plant community has degraded significantly, inputs such as range seeding, prescribed fire, or mechanical treatment may be required to return the site to a condition similar to the historic climax plant community.

Knowledge of the ecological site, the historic climax plant community, and the potential vegetation states that can exist on a site is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, the potential for recreational uses, and the condition of watersheds.

Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the historic climax plant community. It also requires an evaluation of the present rangeland similarity index and rangeland trend. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the "National Range and Pasture Handbook" (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html).

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a rangeland similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing use, timely deferment of grazing, and planned rotation grazing systems are key practices. The experience of ranchers and research has shown that if no more than one-half of the current year's growth is grazed, the current plant community can be maintained or possibly improved. The remaining one-half enables plants to make and store food for regrowth and root development. As a result, the desirable plants remain healthy, and less desirable grasses and weeds do not replace them. Also, the plant cover protects the soil from water erosion and soil blowing, improves tilth, increases the rate of water infiltration, and helps to control runoff.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These practices include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding.

Various kinds of grazing systems can be used in rangeland management. No single grazing system is best under all conditions. The grazing system should increase the quantity and improve the quality of the range vegetation; should meet the needs of the individual operator; and should be designed according to topography, type of grazing animals, and resource management objectives.

Special improvement practices are needed in areas where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These practices include range seeding, brush management, water spreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for rangeland improvement. On other soils, however, only proper grazing management can improve the range. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical

brush and weed control, and water spreading. Those soils in capability classes 7 and 8, however, are not suitable. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification, for seeding and as a means of increasing the rate of water infiltration for seed germination.

Where feasible, mechanical renovation practices, such as shallow chiseling, can help to speed recovery of the desired plants. These practices open up the surface and thus allow absorption of more moisture and production of more desirable plants. Mechanical renovation, brush management, and timely deferment of grazing allow recovery of desired plants.

Seeding may be needed in areas where less desirable plants are dominant. A clean, firm seedbed should be prepared, suitable species should be selected for seeding, and rest periods should be long enough to allow the new plants to become established. Special improvement practices can be effective only if the management system helps to keep the desirable plants healthy.

Forestland Understory Management

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forestland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Forest understory production can be influenced by controlling canopy density in addition to the management of stocking rates, distribution, and season of use. Often both the forestland and range resources can be enhanced through thinning the overstory to canopy levels that optimize both timber and forage production. Broadcast seeding of disturbed areas soon after timber harvest can improve forage quantity and quality and reduce the chances of undesirable plants occupying the site.

Steepness of slopes and distance to drinking water are severe grazing management problems in much of the mountain and foothill areas. Variations in primary season of use, production levels, and plant communities because of elevation and aspect changes present additional challenges. Long, steep slopes provide limited access to livestock. Less sloping areas are subject to overuse. Grazing should be delayed until the soil is firm enough to withstand trampling and the plants have matured enough to withstand grazing pressure.

Riparian areas should be protected from overuse by livestock. Misuse results in deterioration of protective vegetation, reduction of streambank stability, and excessive erosion. Developing off-stream-watering locations can successfully prevent cattle from overgrazing riparian areas and encourage better livestock distribution.

Forestland

The tables in this section can help forest owners or managers plan the use of soils for wood crops. The soils are rated according to the limitations that affect various aspects of forest management. In these tables, interpretive ratings are given for various aspects of forest management. The ratings in the tables are in both text and numerical format.

Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more

properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified forest management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/nfmanual/).

The table "Haul Roads, Log Landings, and Seedling Mortality on Forestland," shows interpretive ratings related to limitations affecting construction of haul roads and log landings, suitability for log landings, and potential for seedling mortality.

For *limitations affecting construction of haul roads and log landings,* the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities; *moderate* indicates that one or more limitations can cause some difficulty in construction; and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope.

Rating class terms for seedling mortality are expressed as *low, moderate*, and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

The table "Forestland Planting and Harvesting," shows interpretive ratings related to suitability for hand planting, suitability for mechanical planting, and suitability for use of harvesting equipment.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

The table "Forestland Site Preparation" shows interpretive ratings related to suitability for mechanical site preparation (surface) and suitability for mechanical site preparation (deep).

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Recreation

The soils of the survey area are rated in the "Camp Areas, Paths and Trails, and Off-road Vehicle Trails" table according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential. The information in the "Camp Areas, Paths and Trails, and Off-road Vehicle Trails" table can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the

surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road vehicle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The "Dwellings and Small Commercial Buildings" table shows the degree and kind of soil limitations that affect dwellings with and without basements and small commercial buildings.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

The “Roads and Streets, Shallow Excavations, and Lawns and Landscaping” table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; available water capacity in the upper 40 inches; content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding; depth to a water table; ponding; slope; stoniness; and the amount of sand, clay, or organic matter in the surface layer. The soils in this survey area have not been rated for potential use for lawns and landscaping because of the degree that the soils have been impacted. Onsite evaluation is required to determine the suitability of the soils for use for lawns and landscaping.

Sanitary Facilities

The “Sewage Disposal” table shows the degree and kind of soil limitations that affect septic tank absorption fields and sewage lagoons. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the

soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose gravel and sand or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils, the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

The tables in this section show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store domestic or animal waste. Domestic wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The table “Agricultural Disposal of Manure and Sewage Sludge” shows interpretive ratings related to application of manure and application of sewage sludge.

Application of manure not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry. The manure waste is either solid, slurry, or liquid. Nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is 50 to 90 percent water, and solid if it is less than 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

The table "Agricultural Disposal of Wastewater by Irrigation and Overland Flow," shows interpretive ratings related to disposal of wastewater by irrigation and disposal of wastewater by overland flow.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Disposal of wastewater by overland flow is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

The table "Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment" shows interpretive ratings related to rapid infiltration of wastewater and slow rate treatment of wastewater.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a

water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented through either control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

The Construction Materials tables include “Construction Material Potential” and “Source of Reclamation Material, Roadfill, and Topsoil.” These tables give information about the soils as potential sources of gravel and sand, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *Sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the Construction Materials tables, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of gravel or sand are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of gravel and sand. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel or sand. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of reclamation material and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil

material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material. The soils in this survey area have not been rated for potential use as topsoil because of the degree that the soils have been impacted. Onsite evaluation is required to determine the suitability of the soils for use as topsoil.

Water Management

The “Ponds and Embankments” table gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

The "Engineering Index Properties" table gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 based on particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 based on visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group

index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

The “Physical Properties of the Soils” table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root

penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the "Physical Properties of the Soils" table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1

are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

The “Chemical Properties of the Soils” table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

The "Water Features" table gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redox features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding.

Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

The “Soil Features” table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability,

content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Taxonomic Classification of the Soils," shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in sol. An example is 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 Cryolls (*Cry*, meaning soil with a cryic temperature regime, plus *olls*, from Mollisols).

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 Argicryolls (*Argi*, meaning soils with an argillic horizon, plus *cryolls*, the suborder of the Mollisols that has a cryic temperature regime).

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

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 loamy-skeletal, mixed, superactive Ustic Argicryolls.

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

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

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993) and in the "Field Book for Describing and Sampling Soils" (Schoeneberger and others, 2002). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2003). Unless otherwise indicated, colors in the descriptions are for dry soil.

Adel Series

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

Typical Pedon

Adel silt loam, 8 to 15 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,400 feet south and 1,400 feet west of the NE corner of sec. 14, T. 3 S., R. 16 W. Highland Ranch topographic quadrangle, UTM 12T, 0301923e, 5050091n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral (pH 6.7); clear wavy boundary.

A2—9 to 16 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine roots; 5 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bw1—16 to 28 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; moderately hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; slightly acid (pH 6.5); clear wavy boundary.

Bw2—28 to 43 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; moderate fine and medium subangular blocky structure parting to moderate very fine and fine granular; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; slightly acid (pH 6.3); clear wavy boundary.

Bw3—43 to 52 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; moderate fine and medium subangular blocky structure parting to moderate very fine and fine granular; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

C—52 to 60 inches; light yellowish brown (2.5Y 6/3) gravelly loam, light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; 30 percent gravel; neutral (pH 7.1).

Barbarela Series

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

Typical Pedon

Barbarela loam, in an area of Barbarela-Rogert complex, 8 to 35 percent slopes, in rangeland, Beaverhead County, Montana, approximately 2,100 feet south and 650 feet west of the NE corner of sec. 6, T. 3 S., R. 14 W. Stewart Mountain topographic quadrangle, UTM 12T, 315191e, 5052770n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.6); clear smooth boundary.

AB—4 to 10 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 15 percent gravel; 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Bt1—10 to 17 inches; yellowish brown (10YR 5/4), gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 30 percent gravel; neutral (pH 6.7); clear wavy boundary.

Bt2—17 to 25 inches; yellowish brown (10YR 5/6), gravelly sandy clay loam, dark yellowish brown (10YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 30 percent gravel; neutral (pH 6.8); gradual wavy boundary.

Cr—25 to 42 inches; pale yellow (2.5Y 7/3) grus that crushes to very gravelly coarse sand, light olive brown (2.5Y 5/4) moist; neutral (pH 6.8).

R--42 to 60 inches; granite bedrock.

Bata Series Family

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

Typical Pedon

Bata gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

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

Bw—0 to 9 inches; brown (7.5YR 5/4) gravelly ashy silt loam, dark brown (7.5YR 4/4) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

2E/Bt—9 to 20 inches; E part (70 percent) is pinkish gray (7.5YR 7/2) gravelly loam, pinkish gray (7.5YR 6/2) moist interfingering into B part; B part (30 percent) is pink (7.5YR 7/4) gravelly loam, brown (7.5YR 5/4) moist; texture mixed is gravelly loam; weak medium subangular blocky structure; slightly hard, very friable, nonsticky

and nonplastic; many fine and medium roots; many fine pores; 30 percent gravel; moderately acid (pH 5.7); clear wavy boundary.

2Bt1—20 to 36 inches; pink (7.5YR 7/4) very gravelly clay loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, slightly sticky and moderately plastic; few fine roots; common fine pores; few distinct clay films on faces of peds and lining pores; 40 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

2Bt2—36 to 60 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, slightly sticky and moderately plastic; few fine roots; common fine pores; continuous prominent clay films on faces of peds and lining pores; 35 percent gravel; 10 percent cobbles; slightly acid (pH 6.2).

Bearmouth Series

Taxonomic Class: Sandy-skeletal, mixed Ustic Haplocryolls

Typical Pedon

Bearmouth very gravelly loam, 0 to 4 percent slopes, in rangeland, Beaverhead County, Montana, approximately 2,050 feet north and 2,300 feet east of the SW corner of sec. 21, T. 7 S., R. 14 W. Peterson Lake topographic quadrangle, UTM 12T, 17057e, 5009100n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; many very fine, common fine, and few medium roots; many very fine and fine dendritic tubular pores; 35 percent gravel; 10 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bw—5 to 13 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; many very fine and common fine dendritic tubular pores; 50 percent gravel; 10 percent cobbles; neutral (pH 6.6); clear wavy boundary.

2C—13 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; many very fine and few fine roots; 40 percent gravel; 30 percent cobbles; neutral (pH 6.6).

Beaverslide Series

Taxonomic Class: Fine, mixed, superactive Oxyaquic Argicryolls

Typical Pedon

Beaverslide silt loam, 0 to 4 percent slopes, in irrigated grass hay, Beaverhead County, Montana, 150 feet south and 2,100 feet west of the NE corner of sec. 25, T. 4 S., R. 16 W. Ajax Ranch topographic quadrangle, UTM 12T, 303371e, 5037747n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—2 to 7 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; few fine and medium faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium

subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

A2—7 to 12 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; common fine and medium faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

E/Bt—12 to 15 inches; E part (70 percent) is light gray (10YR 7/1) silt loam, grayish brown (10YR 5/2) moist; Bt part (30 percent) is brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; few faint patchy clay films on faces of peds; many silt and sand skeletans on faces of peds; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt—15 to 21 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; strong coarse prismatic structure parting to strong medium and coarse angular blocky; hard, firm, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; faint continuous and common distinct patchy clay films on faces of peds; 5 percent gravel; slightly alkaline (pH 7.4); clear wavy boundary.

Btk—21 to 37 inches; light brown (7.5YR 6/4) silty clay loam, strong brown (7.5YR 5/6) moist; strong medium prismatic structure parting to strong fine and medium angular blocky; hard, firm, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; faint continuous and few distinct patchy clay films on faces of peds; 5 percent gravel; disseminated lime and common fine and medium patchy soft masses and threads of lime; slightly effervescent on faces of peds; slightly alkaline (pH 7.8); clear wavy boundary.

Bk—37 to 60 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; 10 percent gravel; disseminated lime and common fine and medium patchy soft masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.4).

Bighole Series

Taxonomic Class: Fine-loamy, mixed, superactive Oxyaquic Argicryolls

Typical Pedon

Bighole silt loam, 0 to 4 percent slopes, in irrigated grass hay, Beaverhead County, Montana, approximately 750 feet south and 1,350 feet east of the NW corner of sec. 32, T. 3 S., R. 16 W. Highland Ranch topographic quadrangle, UTM 12T, 0296917e, 5047044n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—2 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

A2—8 to 17 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt/E—17 to 26 inches; Bt part (60 percent) light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist; E part (40 percent) very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; few fine faint brown (7.5YR 5/4) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; few faint patchy clay films on faces of peds; many silt and sand skeletans on faces of peds; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt—26 to 41 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 10 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bk—41 to 60 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very few fine roots; common very fine dendritic tubular pores; 10 percent gravel; disseminated lime and many fine and medium patchy soft masses and threads of lime; strongly effervescent; slightly alkaline (pH 7.8).

Bridger Series Family

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Bridger loam (Colors are for dry soil unless otherwise noted.)

A—0 to 9 inches, very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; 1 percent stones below surface; neutral (pH 7.0); clear wavy boundary.

Bt—9 to 24 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium prismatic parting to strong fine, medium, and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common very fine roots; many very fine pores; distinct continuous very dark grayish brown (10YR 3/2) moist; clay films on faces of peds; 5 percent gravel; 1 percent stones; neutral (pH 7.0); clear wavy boundary.

Bk1—24 to 36 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; 15 percent gravel; 5 percent cobbles; few large masses of lime; continuous distinct lime casts on undersides of rock fragments; strongly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.

Bk2—36 to 60 inches, light yellowish brown (2.5Y 6/3) gravelly loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; 20 percent gravel; 5 percent cobbles; common distinct lime casts on undersides of rock fragments mainly in the upper part of the horizon; disseminated lime; strongly effervescent; moderately alkaline (pH 8.0).

Briston Series

Taxonomic Class: Fine-loamy, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Briston loam, in an area of Briston-Mussigbrod complex, 0 to 2 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,400 feet west and 400 feet north of the SE corner of sec. 15, T. 2 S., R. 16 W. Gibbons School topographic quadrangle, UTM 12T, 300516e, 5058864n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, slightly sticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; moderately acid (pH 6.0); gradual wavy boundary.

BA—4 to 9 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine tubular pores; 10 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

Bt1—9 to 20 inches; brown (7.5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; strong medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; many distinct patchy clay films on faces of peds; common very fine and fine and few medium roots; many very fine tubular pores; 15 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

Bt2—20 to 29 inches; strong brown (7.5YR 5/6) gravelly clay loam, brown (7.5YR 4/4) moist; strong coarse angular blocky structure; very hard, firm, moderately sticky and moderately plastic; many prominent continuous clay films on faces of peds; few very fine, fine, and medium roots; many very fine tubular pores; 30 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

Bt3—29 to 39 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; strong medium angular blocky structure; very hard, firm, moderately sticky and moderately plastic; common distinct patchy clay films on faces of peds; few very fine and fine roots; few medium tubular pores; 60 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

C—39 to 60 inches; reddish yellow (7.5YR 7/6) extremely gravelly loamy sand, reddish yellow (7.5YR 6/6) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 60 percent gravel; 10 percent cobbles; slightly acid (pH 6.4).

Butchhill Series

Taxonomic Class: Clayey-skeletal, smectitic Alfic Argicryolls

Typical Pedon

Butchhill gravelly loam, 15 to 45 percent slopes, stony, in rangeland, Beaverhead County, Montana, 3,100 feet south and 2,100 feet west of the NE corner of sec. 36, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 0322550e, 5015693n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 12 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common very

fine, fine, and medium roots; 15 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear irregular boundary.

E/Bt—12 to 19 inches; E part (80 percent) is pinkish gray (7.5YR 7/2) very gravelly loam, light brown (7.5YR 6/4) moist; Bt part (20 percent) is light brown (7.5YR 6/3) very gravelly loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common distinct clay films on all faces of peds; many very fine, fine, and medium roots; 30 percent gravel; 10 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

Bt1—19 to 30 inches; light brown (7.5YR 6/3) very cobbly clay, brown (7.5YR 5/4) moist; strong medium subangular blocky structure; very hard, firm, very sticky and very plastic; many prominent clay films on all faces of peds; many very fine, fine, and medium roots; 30 percent gravel; 20 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

Bt2—30 to 60 inches; pink (7.5YR 7/3) very cobbly clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; common distinct clay films on all faces of peds; few fine and medium roots; 35 percent gravel; 20 percent cobbles; slightly acid (pH 6.2).

Comad Series Family

Taxonomic Class: Sandy-skeletal, mixed Lamellic Cryorthents

Typical Pedon

Comad extremely stony sandy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches; undecomposed and slightly decomposed forest litter.

E1—3 to 8 inches; light brownish gray (10YR 6/2) extremely stony sandy loam, brown (10YR 5/3) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; 15 percent gravel; 25 percent cobbles; 30 percent stones; strongly acid (pH 5.4); clear smooth boundary.

E2—8 to 20 inches; very pale brown (10YR 7/3) extremely stony loamy sand, brown (10YR 5/3) moist; weak fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine tubular and interstitial pores; 15 percent gravel; 25 percent cobbles; 30 percent stones; strongly acid (pH 5.3); gradual wavy boundary.

E and Bt1—20 to 33 inches; E part (90 percent) very pale brown (10YR 7/3) extremely stony loamy sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; Bt part (10 percent) yellowish brown (10YR 5/4) sandy clay loam lamellae; hard, friable, slightly sticky and slightly plastic; wavy and discontinuous lamellae, 1/8- to 1/2-inch thick and 2 to 6 inches apart; common very fine and fine and few medium roots; many very fine tubular and interstitial pores; 20 percent gravel; 25 percent cobbles; 30 percent stones; moderately acid (pH 5.7); gradual smooth boundary.

E and Bt2—33 to 60 inches; E part (95 percent) very pale brown (10YR 7/4) extremely stony loamy sand, yellowish brown (10YR 5/6) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few fine and medium roots; few very fine tubular pores; Bt2 part (5 percent) dark yellowish brown (10YR 4/4) moist sandy loam lamellae; 15 percent gravel; 30 percent cobbles; 35 percent stones; moderately acid (pH 5.7).

Como Series Family

Taxonomic Class: Sandy-skeletal, mixed Typic Eutrocryepts

Typical Pedon

Como gravelly sandy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed forest litter.
E—2 to 12 inches; brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; few very fine and fine tubular pores; 15 percent gravel; 5 percent cobbles; moderately acid (pH 5.8); clear wavy boundary.
BC—12 to 26 inches; pale brown (10YR 6/3) very cobbly loamy coarse sand, brown (10YR 5/3) moist; single grain; loose; common fine, medium, and coarse roots; few very fine tubular pores; 25 percent gravel; 10 percent cobbles; 5 percent stones; moderately acid (pH 6.0); gradual wavy boundary.
C—26 to 60 inches—very pale brown (10YR 7/3) very stony loamy coarse sand, pale brown (10YR 6/3) moist; single grain; loose; common medium and coarse roots; common fine and medium interstitial pores; 25 percent gravel; 10 percent cobbles; 10 percent stones; moderately acid (pH 6.0).

Copperbasin Series

Taxonomic Class: Sandy-skeletal, mixed Aquic Haplocryolls

Typical Pedon

Copperbasin very cobbly loam, in an area of Foxgulch-Mooseflat-Copperbasin complex, 0 to 4 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, approximately 1,800 feet south and 1,800 feet west of the NE corner of sec. 34, T. 5 S., R. 15 W. Jackson topographic quadrangle, UTM 12T, 0309127e, 50254311n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed matted roots; abrupt smooth boundary.
A—1 to 7 inches; very dark grayish brown (10YR 3/2) very cobbly loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; 35 percent gravel; 25 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.
AC—7 to 16 inches; grayish brown (10YR 5/2) extremely cobbly loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and common fine roots; 40 percent gravel; 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
C1—16 to 35 inches; grayish brown (2.5Y 5/2) extremely cobbly sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 40 percent gravel; 30 percent cobbles; neutral (pH 6.6); clear wavy boundary.
C2—35 to 60 inches; light brownish gray (2.5Y 6/2) extremely cobbly sand, grayish brown (2.5Y 5/2) moist; common fine distinct strong brown (7.5YR 5/6) redox concentrations; single grain; loose, nonsticky and nonplastic; few very fine roots; 40 percent gravel; 30 percent cobbles; neutral (pH 6.6).

Cowcamp Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Oxyaquic Argicryolls

Typical Pedon

Cowcamp silt loam, in an area of Cowcamp-Maybee complex, 0 to 2 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, 750 feet south and 1,300 feet east of the NW corner of sec. 32, T. 3 S., R. 16 W. Highland Ranch topographic quadrangle, UTM 12T, 0296202e, 5045687n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—2 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; neutral (pH 6.7); clear wavy boundary.

A2—6 to 13 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt/E—13 to 18 inches; Bt part (60 percent) light brown (7.5YR 6/3) gravelly silt loam, brown (7.5YR 5/3) moist; E part (40 percent) pinkish gray (7.5YR 7/2) gravelly silt loam, pinkish gray (7.5YR 6/2) moist; common fine and medium faint strong brown (7.5YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; few faint patchy clay films on faces of peds; many silt and sand skeletans on faces of peds; 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—18 to 28 inches; light yellowish brown (10YR 6/4) very cobbly clay loam, yellowish brown (10YR 5/4) moist; few fine faint strong brown (7.5YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 25 percent gravel; 20 percent cobbles; neutral (pH 6.7); clear wavy boundary.

Bt2—28 to 35 inches; brownish yellow (10YR 6/6) very gravelly loam, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine dendritic tubular pores; few faint patchy clay films on faces of peds; 40 percent gravel; 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

BC—35 to 60 inches; pink (7.5YR 7/4) very gravelly sandy loam, strong brown (7.5YR 5/6) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; common very fine interstitial pores; 40 percent gravel; 15 percent cobbles; neutral (pH 6.7).

Danielvil Series

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

Typical Pedon

Danielvil very fine sandy loam, in an area of Danielvil-Englejard-Philipsburg complex, 0 to 4 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,750 feet south and 1,650 feet west of the NE corner of sec. 3, T. 2 S., R. 15 W. Mud Lake topographic quadrangle, UTM 12T, 0310405e, 5062647n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 11 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and few fine roots; slightly acid (pH 6.5); clear wavy boundary.

Bw—11 to 29 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and nonplastic; common very fine roots; 5 percent gravel; neutral (pH 6.9); clear wavy boundary.

C1—29 to 37 inches; pale yellow (2.5Y 7/3) fine sandy loam, light olive brown (2.5Y 5/3) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; 5 percent gravel; neutral (pH 7.1); clear wavy boundary.

C2—37 to 47 inches; pale yellow (2.5Y 7/4) gravelly fine sandy loam, light olive brown (2.5Y 5/4) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; 15 percent gravel; 5 percent cobbles; neutral (pH 7.2); clear wavy boundary.

C3—47 to 60 inches; yellow (2.5Y 8/6) gravelly sandy loam, light olive brown (2.5Y 5/6) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; 15 percent gravel; 5 percent cobbles; neutral (pH 7.3).

Donald Series

Taxonomic Class: Fine, smectitic Alfic Argicryolls

Typical Pedon

Donald loam, 2 to 8 percent slopes, in rangeland, Beaverhead County, Montana, 1,900 feet east and 400 feet north of the SW corner of sec. 25, T. 4 S., R. 15 W. Fox Gulch topographic quadrangle, UTM 12T, 310611e, 5035672n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 11 inches; very dark grayish brown (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; 10 percent gravel; neutral (pH 6.8); gradual wavy boundary.

A2—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, nonsticky and nonplastic; many very fine and fine and common medium roots; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

E/Bt—15 to 20 inches; E part (60 percent) is light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist, Bt part (40 percent) is light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular

blocky structure; hard, firm, slightly sticky and slightly plastic; common distinct clay films on all faces of peds; common very fine, fine, and medium roots; 10 percent gravel; neutral (pH 7.2); abrupt wavy boundary.

Bt—20 to 30 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; strong medium prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm, very sticky and very plastic; many prominent clay films on all faces of peds; common very fine and fine roots; 10 percent gravel; slightly alkaline (pH 7.8); clear wavy boundary.

Btk—30 to 38 inches; pale brown (10YR 6/3) gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many prominent clay films on all faces of peds; common very fine and fine roots; 20 percent gravel; many medium and coarse soft masses of lime on all faces of peds; moderately alkaline (pH 8.0); gradual wavy boundary.

Bk—38 to 60 inches; pale brown (10YR 6/3) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; disseminated calcium carbonate; 30 percent gravel; 10 percent cobbles; many medium and coarse soft masses of lime on all faces of peds; moderately alkaline (pH 8.0).

Doolittle Series

Taxonomic Class: Fine, smectitic Vertic Haplocryalfs

Typical Pedon

Doolittle clay loam, in an area of Doolittle-Philipsburg-Hooligan complex, 2 to 15 percent slopes, in rangeland, Beaverhead County, Montana, Mud Lake topographic quadrangle, UTM 12T, 313411e, 5059136n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—3 to 12 inches; gray (10YR 6/1) silty clay loam, dark grayish brown (10YR 4/2) moist; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; many distinct clay films on faces of peds; 5 percent gravel; neutral (pH 6.7); clear smooth boundary.

Bt2—12 to 28 inches; light brownish gray (10YR 6/2) silty clay, brown (10YR 5/3) moist; strong medium and coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; many prominent clay films on faces of peds; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bk—28 to 39 inches; pale yellow (10YR 8/2) paragravelly silt loam, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky structure; soft, very friable, very sticky and nonplastic; 20 percent paragravel; disseminated lime and many fine and medium patchy soft masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.

Cr—39 to 60 inches; white (2.5Y 8/1) semiconsolidated sedimentary beds that crush to silt loam, light yellowish brown (2.5Y 6/2) moist; neutral (pH 7.2).

Dunkleber Series

Taxonomic Class: Euic Typic Cryofibrists

Typical Pedon

Dunkleber mucky peat, in an area of Tepete-Dunkleber-Mooseflat complex, 0 to 2 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,300 feet south and 600 feet east of the NW corner of sec. 21, T. 4 S., R. 16 W. Ajax Ranch topographic quadrangle, UTM 12T, 297363e, 5038834n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi1—0 to 18 inches; very dark grayish brown (10YR 3/2) mucky peat, very dark brown (10YR 2/1) moist; about 90 percent fiber and raw herbaceous material, 70 percent rubbed; massive; nonsticky and nonplastic; strongly acid (pH 5.2); abrupt smooth boundary.

Oi2—18 to 32 inches; very dark grayish brown (10YR 3/2) mucky peat, black (10YR 2/1) moist; about 80 percent fiber and raw herbaceous material, 55 percent rubbed; massive; nonsticky and nonplastic; strongly acid (pH 5.2); abrupt smooth boundary.

Oi3—32 to 45 inches; very dark brown (10YR 2/2) mucky peat, black (10YR 2/1) moist; about 70 percent fiber and raw herbaceous material, 50 percent rubbed; massive; nonsticky and nonplastic; strongly acid (pH 5.2); abrupt smooth boundary.

Oi4—45 to 60 inches; very dark brown (10YR 5/2) mucky peat, very dark brown (10YR 2/2) moist; about 50 percent fiber and raw herbaceous material, 40 percent rubbed; massive; nonsticky and nonplastic; moderately acid (pH 5.6).

Eachuston Series

Taxonomic Class: Sandy-skeletal, mixed Typic Cryaquents

Typical Pedon

Eachuston silt loam, in an area of Mooseflat-Eachuston-Copperbasin complex, 0 to 2 percent slopes, in riparian range, Beaverhead County, Montana, approximately 2,300 feet south and 1,950 feet west of the NE corner of sec. 9, T. 2 S., R. 15 W. Mud Lake topographic quadrangle, UTM 12T, 308653e, 5061168n. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A—2 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; few fine and medium distinct brown (7.5YR 4/4) redox concentrations; massive; moderately hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral (pH 7.1); clear wavy boundary.

ACg—6 to 10 inches; light brownish gray (2.5Y 6/2) silt loam, dark gray (2.5Y 4/1) moist; common fine and medium distinct brown (7.5YR 4/4) redox concentrations and few, fine and medium distinct dark greenish gray (10GY 4/1) redox depletions; massive; moderately hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; 5 percent gravel; neutral (pH 6.7); clear wavy boundary.

2C—10 to 60 inches; pale brown (10YR 6/3) extremely gravelly sand, brown (10YR 5/3) moist; common fine and medium distinct brown (7.5YR 4/4) redox concentrations; single grain; loose, nonsticky and nonplastic; 50 percent gravel; 20 percent cobbles; neutral (pH 6.9).

Eine Series

Taxonomic Class: Sandy-skeletal, mixed Argic Cryaquolls

Typical Pedon

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

A1—0 to 2 inches; very dark brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; strongly alkaline (pH 8.8); clear smooth boundary.

A2—2 to 4 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; strongly alkaline (pH 8.8); clear smooth boundary.

Btn—4 to 8 inches; very dark gray (10YR 3/1) sandy clay loam, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; common very fine tubular pores; common faint clay films on faces of peds; strongly alkaline (pH 8.8); clear smooth boundary.

BCn—8 to 12 inches; grayish brown (10YR 5/2) very fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular pores; slightly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

2Cn1—12 to 20 inches; dark grayish brown (10YR 4/2) sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; common very fine roots; few medium tubular pores; 10 percent gravel; very strongly alkaline (pH 9.6); clear smooth boundary.

2Cn2—20 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; common very fine roots; few medium tubular pores; 35 percent gravel; 15 percent cobbles; very strongly alkaline (pH 9.6).

Elkner Series Family

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

Typical Pedon

Elkner sandy loam (Colors are for dry soil unless otherwise noted.)

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

E1—2 to 9 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; 5 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

E2—9 to 22 inches; light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 5 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

E and Bt—22 to 38 inches; E part (80 percent) is light yellowish brown (10YR 6/4) coarse sandy loam, brown (10YR 4/3) moist; B part (20 percent) is yellowish brown (10YR 5/4) coarse sandy loam lamellae 1/8- to 1/2-inch thick, dark

yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; 10 percent gravel; moderately acid (pH 5.8); gradual wavy boundary.

BC—38 to 60 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, brown (10YR 4/3) moist, single grain; loose, nonsticky and nonplastic; 20 percent gravel; moderately acid (pH 5.8).

Elve Series Family

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

Typical Pedon

Elve very cobbly loam (Colors are for dry soil unless otherwise noted.)

Oe—0 to 1 inch; forest litter of undecomposed and decomposed needles, twigs, and cones.

A—1 to 3 inches; pale brown (10YR 6/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many medium and coarse roots; many very fine and fine pores; 30 percent angular gravel; 25 percent angular cobbles; moderately acid (pH 5.8); abrupt wavy boundary.

E—3 to 18 inches; very pale brown (10YR 7/4) very cobbly loam, yellowish brown (10YR 5/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many very fine and fine pores; 25 percent angular gravel; 30 percent angular cobbles; strongly acid (pH 5.5); gradual wavy boundary.

Bw1—18 to 34 inches; light yellowish brown (10YR 6/4) extremely cobbly loam, yellowish brown (10YR 5/6) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine pores; 30 percent angular gravel; 35 percent angular cobbles; strongly acid (pH 5.4); gradual wavy boundary.

Bw2—34 to 47 inches; yellow (10YR 7/6) extremely cobbly sandy loam, yellowish brown (10YR 5/6) moist; weak fine subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine pores; 30 percent angular gravel; 35 percent angular cobbles; strongly acid (pH 5.4); gradual wavy boundary.

BC—47 to 60 inches; yellow (10YR 7/6) extremely cobbly sandy loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots; common fine irregular pores; 40 percent angular gravel; 45 percent angular cobbles; strongly acid (pH 5.2).

Elvick Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Oxyaquic Eutrocryepts

Typical Pedon

Elvick very cobbly loam (Colors are for dry soil unless otherwise noted.)

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

A—0 to 1 inch; dark grayish brown (10YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; many

very fine and fine interstitial pores; 15 percent gravel; 20 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

E1—1 to 7 inches; light brownish gray (10YR 6/2) very cobbly loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 20 percent gravel; 25 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

E2—7 to 18 inches; light brownish gray (10YR 6/2) very cobbly loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 20 percent gravel; 30 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

E/Bw—18 to 26 inches; E part (80 percent) is light brownish gray (10YR 6/2) very cobbly coarse sandy loam, brown (10YR 5/3) moist; Bw part (20 percent) is pale brown (10YR 6/3) very cobbly coarse sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine interstitial pores; 25 percent gravel; 30 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

Bw—26 to 38 inches; pale brown (10YR 6/3) very cobbly coarse sandy loam, brown (10YR 4/3) moist; common fine distinct strong brown (7.5YR 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, slightly sticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine interstitial pores; 25 percent gravel; 30 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

BC—38 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; common fine distinct strong brown (7.5YR 5/6) redox concentrations; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine interstitial pores; 25 percent gravel; 40 percent cobbles; slightly acid (pH 6.4).

Englejard Series

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Englejard loam, in an area of Danielvil-Englejard-Philipsburg complex, 0 to 4 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,000 feet north and 2,350 feet west of the SE corner of sec. 3, T. 2 S., R. 15 W. USGS Mud Lake topographic quadrangle, UTM, 12T, 31001e, 5062085n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 9 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and nonplastic; many very fine and few fine roots; 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw—9 to 27 inches; very pale brown (10YR 7/4) very fine sandy loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and few fine roots; 5 percent gravel; neutral (pH 7.1); clear wavy boundary.

BC—27 to 35 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine granular structure; soft, very

friable, slightly sticky and nonplastic; few very fine roots; 10 percent gravel; neutral (pH 6.9); clear wavy boundary.
2C—35 to 60 inches; very pale brown (10YR 7/3) very gravelly loamy sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; 45 percent gravel; 5 percent cobbles; neutral (pH 6.8).

Finn Series

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

Typical Pedon

Finn silt loam, in an area of Bearmouth-Mooseflat-Finn complex, 0 to 4 percent slopes, in grass pasture, Beaverhead County, Montana, approximately 1,900 feet north and 700 feet east of the SW corner of sec. 5, T. 7 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 315151e, 5014009n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.
A1—3 to 7 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; neutral (pH 6.7); clear smooth boundary.
A2—7 to 15 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral (pH 6.8); clear smooth boundary.
Bw1—15 to 27 inches; white (2.5Y 8/1) very cobbly loam, light gray (10YR 7/1) moist; common fine and medium distinct irregular yellowish brown (10YR 5/6) redox concentrations; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine roots; 30 percent gravel; 15 percent cobbles; neutral (pH 6.8); clear smooth boundary.
2Bw2—27 to 35 inches; light gray (5Y 7/1) extremely gravelly sandy loam, light olive gray (5Y 6/2) moist; massive; soft, very friable, slightly sticky and nonplastic; few very fine roots; 50 percent gravel; 15 percent cobbles; neutral (pH 7.0); clear smooth boundary.
2Cg—35 to 60 inches; light gray (5Y 7/1) extremely cobbly loamy sand, light olive gray (5Y 6/2) moist; single grain; loose, nonsticky and nonplastic; 40 percent gravel; 25 percent cobbles; neutral (pH 7.3).

Foolhen Series

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

Typical Pedon

Foolhen loam, 0 to 4 percent slopes, in rangeland, Deer Lodge County, Montana, 700 feet north and 1,600 feet west of the SE corner of sec. 31, T. 1 N., R. 14 W.

Oi—0 to 6 inches; partially decomposed organic matter.
Oe—6 to 11 inches; gray (10YR 4/1) mucky peat, dark gray (10YR 5/1) dry.
A—11 to 19 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic;

many very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.

Bg—19 to 24 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; many medium distinct light olive brown (2.5Y 5/6) and olive yellow (2.5Y 6/6) dry redox concentrations; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine tubular pores; slightly alkaline; clear smooth boundary.

Cg1—24 to 34 inches; gray (5Y 5/1) loam with lenses of very fine sandy loam 1- to 2-inches thick, gray (5Y 6/1) dry; many medium distinct light olive brown (2.5Y 5/6) and olive yellow (2.5Y 6/6) dry redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; moderately alkaline; gradual wavy boundary.

Cg2—34 to 46 inches; gray (5Y 5/1) gravelly sandy clay loam, gray (5Y 6/1) dry; many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; 20 percent gravel; moderately alkaline; gradual wavy boundary.

Cg3—46 to 60 inches; olive (5Y 5/3) very gravelly silt loam, light gray (5Y 7/2) dry; many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) dry redox concentrations; massive; slightly hard, friable, slightly sticky and moderately plastic; few very fine and fine roots; few fine irregular tubular pores; 40 percent gravel; slightly alkaline.

Foxgulch Series

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Fluvaquentic Haplocryolls

Typical Pedon

Foxgulch silt loam, in an area of Foxgulch-Mooseflat-Copperbasin complex, 0 to 4 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, approximately 900 feet north and 1,800 feet west of the SE corner of sec. 10, T. 5 S., R. 15 W. Wisdom topographic quadrangle, UTM 12T, 0310006e, 5050781n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—1 to 11 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent mica flakes; neutral (pH 6.7); clear wavy boundary.

A2—11 to 16 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; strong fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent mica flakes; slightly alkaline (pH 7.5); clear wavy boundary.

Bw—16 to 29 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; common threads and masses of dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; strong fine, medium, and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; 10 percent mica flakes; slightly alkaline (pH 7.6); clear wavy boundary.

BC—29 to 36 inches; light gray (2.5Y 7/2) sandy clay loam, light olive brown (2.5Y 5/3) moist; few fine faint yellowish brown (10YR 5/6) moist redox concentrations; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine dendritic tubular pores; 10 percent mica flakes; 5 percent gravel; neutral (pH 7.3); clear wavy boundary.
2C—36 to 60 inches; pinkish gray (7.5YR 6/2) very gravelly sand, brown (7.5YR 5/2) moist; the upper 10 inches is stratified with lenses of loamy sand, sandy loam and loam with common fine and medium distinct strong brown (7.5YR 5/6) moist redox concentrations; single grain; loose, nonsticky and nonplastic; 10 percent mica flakes; 45 percent gravel; 5 percent cobbles; neutral (pH 6.8).

Gambler Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Glossocryalfs

Typical Pedon

Gambler loam (Colors are for dry soil unless otherwise noted.)

Oe—0.5 to 0 inch; decomposing needles, leaves, and twigs.
E—0 to 8 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; 2 percent gravel; 3 percent cobbles; 3 percent stones; slightly acid; clear wavy boundary.
E/B—8 to 18 inches; E part is about 60 percent pinkish gray (7.5YR 7/2) stony clay loam, light brown (7.5YR 6/4) moist; B part is 40 percent light brown (7.5YR 6/4) stony clay loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 2 percent gravel; 3 percent cobbles; 15 percent stones; neutral; clear wavy boundary.
Bt—18 to 38 inches; light brown (7.5YR 6/4) very stony clay loam, brown (7.5YR 5/4) moist; moderate medium subangular and angular blocky structure; hard, friable, moderately sticky and moderately plastic; 5 percent gravel; 5 percent cobbles; 40 percent stones; few distinct clay films on faces of peds; neutral; clear wavy boundary.
BC—38 to 48 inches; light brown (7.5YR 6/4) very stony clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 5 percent gravel; 5 percent cobbles; 35 percent stones; slightly alkaline; clear wavy boundary.
C—48 to 55 inches; pinkish gray (7.5YR 7/2) very stony clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 5 percent gravel; 5 percent cobbles; 35 percent stones; slightly alkaline.
R--55 inches; hard basalt rock.

Garlet Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Typic Eutrocryepts

Typical Pedon

Garlet stony loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; partially decomposed and undecomposed forest litter.
E1—2 to 6 inches; gray (10YR 6/1) stony loam, dark gray (10YR 4/1) moist; weak thin platy structure parting to very fine granular; soft, very friable, nonsticky and

nonplastic; many fine and common coarse roots; 25 percent gravel; 15 percent stones; moderately acid (pH 5.8); abrupt smooth boundary.

E2—6 to 21 inches; light brownish gray (10YR 6/2) extremely cobbly loam, brown (10YR 5/3) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; common very fine pores; 40 percent gravel; 25 percent cobbles; 5 percent stones; slightly acid (pH 6.3); clear irregular boundary.

Bw/E—21 to 48 inches; B part (60 percent) light brown (7.5YR 6/4), brown (7.5YR 5/4) moist; E part (40 percent) pinkish gray (7.5YR 6/2), brown (7.5YR 5/2) moist; extremely cobbly sandy clay loam; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine and fine pores; faces of peds are coated with gray (10YR 6/1) very fine sand; 40 percent gravel; 25 percent cobbles; 5 percent stones; slightly alkaline (pH 7.6); clear smooth boundary.

Bk—48 to 70 inches; light brownish gray (10YR 6/2) extremely cobbly loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 40 percent gravel; 25 percent cobbles; 5 percent stones; continuous distinct lime coats on undersides of rock fragments; disseminated lime; strongly effervescent; moderately alkaline (pH 8.1).

Gateview Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical Pedon

Gateview gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 10 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; 15 percent gravel; 5 percent cobbles; neutral; clear smooth boundary.

A2—10 to 22 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to fine granular; slightly hard, very friable; 50 percent gravel; 5 percent cobbles; neutral; gradual smooth boundary.

C—22 to 60 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable; 50 percent gravel; 5 percent cobbles; neutral.

Hairpin Series

Taxonomic Class: Fine, smectitic Vertic Argicryolls

Typical Pedon

Hairpin silt loam, 2 to 8 percent slopes, in rangeland, Beaverhead County, Montana, 3,200 feet west and 1,200 feet south of the NE corner of sec. 19, T. 7 S., R. 14 W. Peterson Lake topographic quadrangle, UTM 12T, 313779e, 5009714n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; 10 percent subangular quartzite gravel; moderately acid (pH 6.0); clear smooth boundary.

A2—4 to 12 inches; dark grayish brown (10YR 4/2) cobbly silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure parting to moderate fine and medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; 10 percent subangular quartzite gravel; 15 percent subangular cobbles; slightly acid (pH 6.4); clear wavy boundary.

Bt/E1—12 to 18 inches; Bt part (80 percent) is brown (10YR 5/3), brown (10YR 4/3) moist; E part (20 percent) is light gray (10YR 7/2), light brownish gray (10YR 6/2) moist, clay loam; moderate medium and coarse subangular blocky structure parting to strong fine and medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; common distinct clay films on all faces of peds; common very fine and fine roots; 10 percent subangular quartzite gravel; neutral (pH 6.8); clear wavy boundary.

Bt/E2—18 to 22 inches; Bt part (60 percent) is pale brown (10YR 6/3), brown (10YR 5/3) moist; E part (40 percent) is light gray (10YR 7/2), light brownish gray (10YR 6/2) moist, clay loam; moderate fine and medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common distinct clay films on all faces of peds; common very fine roots; 10 percent subangular quartzite gravel; neutral (pH 7.0); abrupt wavy boundary.

2Btss1—22 to 42 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; many prominent clay films on all faces of peds; common prominent slickensides on vertical faces of peds; few very fine roots; 10 percent subangular quartzite gravel; 1 percent subangular cobbles; neutral (pH 7.0); gradual wavy boundary.

2Btss2—42 to 60 inches; light yellowish brown (10YR 6/4) gravelly clay, yellowish brown (10YR 5/4) moist; moderate coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; many prominent clay films on all faces of peds; common prominent slickensides on vertical faces of peds; few very fine roots; 20 percent subangular quartzite gravel; 5 percent subangular cobbles; neutral (pH 7.0).

Helmville Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

Typical Pedon

Helmville cobbly loam (Colors are for dry soil unless otherwise noted.)

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

E—2 to 10 inches; yellowish brown (10YR 5/4) cobbly loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine discontinuous irregular pores; 15 percent gravel; 15 percent cobbles; neutral (pH 6.6); gradual wavy boundary.

Bt1—10 to 14 inches; dark yellowish brown (10YR 4/4) very cobbly clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and moderately plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine discontinuous irregular pores; many thin continuous clay films on faces of peds; 20 percent gravel; 25 percent cobbles; neutral (pH 7.2); gradual wavy boundary.

Bt2—14 to 25 inches; brownish yellow (10YR 6/6) very cobbly clay loam, yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine, fine, and

medium roots; many very fine and fine discontinuous irregular pores; many thin continuous clay films on faces of peds; 25 percent gravel 30 percent cobbles; slightly alkaline (pH 7.6); clear smooth boundary.

Bk—25 to 60 inches; brownish yellow (10YR 6/6) very cobbly clay loam, yellowish brown (10YR 5/6) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine discontinuous irregular pores; 30 percent gravel; 30 percent cobbles; disseminated lime; continuous distinct lime coats on gravel and cobbles; faint and distinct lime casts on undersides of rock fragments; violently effervescent; moderately alkaline (pH 7.9).

Holloway Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Eutrocryepts

Typical Pedon

Holloway gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches; undecomposed and slightly decomposed forest litter.

A—3 to 13 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 25 percent angular gravel; 5 percent angular cobbles; ash influenced with 5 percent or more glass; strongly acid (pH 5.5); clear wavy boundary.

2E—13 to 20 inches; light gray (10YR 7/2) extremely gravelly fine sandy loam, light brownish gray (10YR 6/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; common very fine and fine pores; 55 percent angular gravel; 10 percent angular cobbles; moderately acid (pH 5.6); gradual smooth boundary.

2E and Bt—20 to 55 inches; E part (75 percent) is light gray (10YR 7/2) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; B part (25 percent) is pale brown (10YR 6/3) fine sandy loam lamellae 1/8- to 1/2-inch thick, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine pores; 55 percent angular gravel; 10 percent angular cobbles; moderately acid (pH 5.9); gradual smooth boundary.

2C—55 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 55 percent angular gravel; 15 percent angular cobbles; slightly acid (pH 6.4).

Hooligan Series

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

Typical Pedon

Hooligan silt loam, in an area of Hooligan-Monaberg complex, 2 to 15 percent slopes, in rangeland, Beaverhead County, Montana, approximately 2,150 feet north and 850 feet east of the SW corner of sec. 13, T. 3 S., R. 15 W. Wisdom topographic quadrangle, UTM 12T, 312368e, 5049425n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

A2—5 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent mica flakes; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—10 to 26 inches; pale brown (10YR 6/3), gravelly clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 10 percent mica flakes; 20 percent gravel; neutral (pH 6.7); clear wavy boundary.

Bt2—26 to 35 inches; light yellowish brown (10YR 6/4), clay loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 5 percent mica flakes; 5 percent gravel; neutral (pH 6.8); gradual wavy boundary.

Cr1—35 to 45 inches; pale yellow (2.5Y 7/3) semiconsolidated siltite beds that crush to loam, light yellowish brown (2.5Y 6/4) moist; neutral (pH 7.1); gradual smooth boundary.

Cr2—45 to 60 inches; pale yellow (2.5Y 7/3) semiconsolidated siltite beds that crush to loam, light yellowish brown (2.5Y 6/4) moist; neutral (pH 7.0).

Inabnit Series

Taxonomic Class: Loamy, mixed, superactive, shallow Ustic Haplocryalfs

Typical Pedon

Inabnit very cobbly loam, stony, in an area of Hooligan-Inabnit complex, 8 to 35 percent slopes, in rangeland, Beaverhead County, Montana, approximately 600 feet south and 100 feet west of the NE corner of sec. 8, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 316852e, 5022661n. (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 30 percent gravel; 20 percent cobbles; neutral (pH 7.1); clear wavy boundary.

Bt—3 to 15 inches; light yellowish brown (10YR 6/4) very paragravelly silty clay loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; many very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds and many faint discontinuous clay films on paragravel fragments; 50 percent semiconsolidated siltite fragments; neutral (pH 7.1); clear wavy boundary.

Cr—15 to 60 inches; light gray (2.5Y 7/1) semiconsolidated siltite beds that crush to silt loam, light yellowish brown (2.5Y 6/3) moist; neutral (pH 7.3).

Jeru Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Typic Dystrocryepts

Typical Pedon

Jeru very stony loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.5 inch; needles, leaves, and twigs.
Oe—0.5 to 2 inches; decomposed organic matter with 0.05 inch of discontinuous, light gray (10YR 7/1) volcanic ash.
A—2 to 7 inches, yellowish brown (10YR 5/4) very stony loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, and few medium roots; many very fine interstitial and few fine tubular pores; 15 percent gravel; 4 percent stones on surface; slightly acid (pH 6.2); clear wavy boundary.
Bw1—7 to 24 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; many very fine interstitial and few fine tubular pores; common very fine mica flakes; 15 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.
Bw2—24 to 33 inches; very pale brown (10YR 7/4) very cobbly sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; soft, very friable; many very fine and few fine roots; many very fine interstitial and common fine tubular pores; many very fine and common fine mica flakes; 20 percent gravel; 20 percent cobbles; neutral (pH 6.6); clear wavy boundary.
C—33 to 62 inches; very pale brown (10YR 7/3) very stony sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; few very fine and fine roots; common very fine interstitial and few fine tubular pores; many very fine, fine, and few medium mica flakes; 20 percent gravel; 20 percent cobbles; 20 percent stones; neutral (pH 6.6).

Kilgore Series

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Cumulic Cryaquolls

Typical Pedon

Kilgore loam, in an area of Kilgore-Mooseflat complex, 0 to 2 percent slopes, in pasture, Deer Lodge County, Montana, 300 feet east and 1,950 feet south of the NW corner of sec. 8, T. 1 S., R. 14 W.

Oe—0 to 2 inches; decomposed organic mat.
A1—2 to 4 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and few fine tubular pores; neutral; clear smooth boundary.
A2—4 to 10 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; common medium prominent dark yellowish brown (10YR 3/4) redox concentrations; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and

slightly plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.

A3—10 to 15 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; neutral; clear wavy boundary.

C1—15 to 27 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and fine tubular pores; neutral; clear wavy boundary.

C2—27 to 31 inches; dark grayish brown (10YR 4/2) fine sandy loam, grayish brown (10YR 5/2) dry; common fine dark grey (10YR 4/1) moist redox depletions; massive; soft, friable, slightly sticky and nonplastic; common very fine and few fine roots; common very fine and fine tubular pores; neutral; clear wavy boundary.

2C3—31 to 60 inches; brown (10YR 5/3) very gravelly sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; common irregular pores; 40 percent gravel; 5 percent cobbles; neutral.

Lehunt Series

Taxonomic Class: Fine-loamy, mixed, superactive Oxyaquic Haplocryalfs

Typical Pedon

Lehunt fine sandy loam, in an area of Lehunt–Lehunt, saline, complex, 0 to 2 percent slopes, in irrigated grass hay and pasture, Beaverhead County, Montana, approximately 1,500 feet north and 1,800 feet west of the SE corner of sec. 4, T. 3 S., R. 15 W. Wisdom topographic quadrangle, UTM 12T, 308264e, 5036779n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; moderately alkaline (pH 8.2); abrupt smooth boundary.

E—3 to 7 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate very coarse angular blocky structure; hard, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and common fine dendritic tubular pores; very strongly alkaline (pH 9.8); abrupt smooth boundary.

Btn—7 to 11 inches; brown (10YR 5/3), sandy clay, dark brown (10YR 3/3) moist; strong medium and coarse columnar structure; extremely hard, firm, moderately sticky and moderately plastic; common very fine roots; common very fine and few fine dendritic tubular pores; very many continuous prominent dark gray (10YR 3/1) clay films on faces of peds; very strongly alkaline (pH 10.0); clear smooth boundary.

Btkn—11 to 15 inches; pale brown (10YR 6/3), loam, brown (10YR 5/3) moist; moderate very coarse prismatic structure; extremely hard, firm, very sticky and very plastic; few very fine roots; common very fine and few fine dendritic tubular pores; many continuous distinct clay films on faces of peds; strongly effervescent; disseminated lime and many fine and medium patchy soft masses and threads of lime; very strongly alkaline (pH 10.3); clear wavy boundary.

BCn1—15 to 32 inches; pale brown (10YR 6/3), sandy loam, yellowish brown (10YR 5/4) moist; weak very coarse and coarse prismatic structure; hard, friable, slightly sticky and nonplastic; few very fine roots; common very fine dendritic tubular pores; slightly effervescent; very strongly alkaline (pH 10.3); clear wavy boundary.

BCn2—32 to 40 inches; light yellowish brown (10YR 6/4), sandy clay loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine dendritic tubular pores; few medium prominent irregular strong brown (7.5YR 5/6) masses of oxidized iron; very strongly alkaline (pH 9.8); clear wavy boundary.
2C—40 to 60 inches; pale brown (10YR 6/3), extremely gravelly sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; 65 percent gravel; slightly alkaline (pH 7.5).

Libeg Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Libeg loam, in an area of Libeg-Adel complex, 2 to 8 percent slopes, in rangeland, Beaverhead County, Montana, 1,000 feet north and 2,400 feet west of the SE corner of sec. 27, T. 3 S., R. 16 W. Highland Ranch topographic quadrangle, UTM 12T, 0299711e, 5046088n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.
A2—5 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.
Bt1—10 to 17 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; moderate very fine and fine subangular blocky structure; moderately hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films between sand grains; 40 percent gravel; 15 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.
Bt2—17 to 24 inches; brownish yellow (10YR 6/6) very gravelly clay loam, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; many faint patchy clay films on faces of peds; 35 percent gravel; 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
Bt3—24 to 60 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; moderate very fine and fine subangular blocky structure; moderately hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films between sand grains; 45 percent gravel; 20 percent cobbles; slightly acid (pH 6.1).

Lilylake Series Family

Taxonomic Class: Sandy-skeletal, mixed Histic Cryaquepts

Typical Pedon

Lilylake muck (Colors are for moist soil unless otherwise noted.)

Oa1—0 to 3 inches; black (10YR 2/1) on broken face and rubbed, muck; about 25 percent fibers, about 5 percent after rubbing; weak medium granular structure; many very fine and fine and few coarse roots; slightly acid (pH 6.2); clear smooth boundary.

Oa2—3 to 9 inches; very dark brown (10YR 2/2) on broken face and rubbed, muck; about 30 percent fibers, about 10 percent after rubbing; massive; many very fine and fine and few coarse roots; moderately acid (pH 6.0); clear wavy boundary.

Oa3—9 to 12 inches; very dark brown (10YR 2/2) on broken face and black (10YR 2/1) rubbed, muck; about 40 percent fibers, about 5 percent after rubbing; massive; many very fine and few coarse roots; moderately acid (pH 6.0); clear wavy boundary.

2C1—12 to 15 inches; dark grayish brown (2.5Y 4/2) sand, brown (10YR 5/3) dry; common fine and medium prominent brown (7.5YR 4/4) and strong brown (7.5YR 4/6) redox concentrations; single grain; loose; many very fine and fine irregular pores; 5 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

2C2—15 to 60 inches; dark grayish brown (2.5Y 4/2) extremely gravelly coarse sand, light brownish gray (2.5Y 6/2) dry; many coarse prominent brown (7.5YR 4/4) and strong brown (7.5YR 4/6) redox concentrations; single grain; loose; many fine and medium irregular pores; 50 percent gravel; 25 percent cobbles; 1 percent stones; slightly acid (pH 6.4).

Littlesalmon Series Family

Taxonomic Class: Sandy-skeletal, mixed Andic Eutrocryepts

Typical Pedon

Littlesalmon ashy loam (Colors are for dry soil unless otherwise noted.)

Oe—0 to 2 inches; slightly decomposed cones, twigs, needles, and leaves.

Oa—2 to 3 inches; highly decomposed Oe horizon material.

A1—3 to 7 inches; grayish brown (10YR 5/2) ashy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine irregular pores; slightly acid (pH 6.4); clear smooth boundary.

A2—7 to 16 inches; brown (10YR 5/3) ashy loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine irregular pores; 1 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

2Bw—16 to 23 inches; pale brown (10YR 6/3) cobbly sandy loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and few coarse roots; many fine tubular pores; 15 percent gravel; 15 percent cobbles; moderately acid (pH 6.0); clear smooth boundary.

2BC—23 to 31 inches; pale brown (10YR 6/3) very cobbly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many medium irregular pores; 20 percent gravel; 30 percent cobbles; neutral (pH 6.6); abrupt wavy boundary.

2Cl—31 to 43 inches; grayish brown (10YR 5/2) and light gray (10YR 7/2) extremely cobbly loamy coarse sand, dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few coarse roots; many medium irregular pores; 90 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.
2C2—43 to 63 inches; similar to 2Cl except colors of grayish brown (10YR 5/2) and very pale brown (10YR 8/3) dry and dark grayish brown (10YR 4/2) and brown (10YR 5/3) moist.
2Cr—63 inches; highly weathered granite.

Loberg Series Family

Taxonomic Class: Clayey-skeletal, mixed, superactive Ustic Glossocryalfs

Typical Pedon

Loberg stony clay loam (Colors are for dry soil unless otherwise noted.)

Oi--0 to 2 inches; forest litter and humus.
E—2 to 5 inches; light brownish gray (10YR 6/2) stony clay loam, dark brown (7.5YR 3/2) moist; weak thick platy structure parting to moderate fine granular; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; sand grains are clear and unstained; 15 percent gravel; 10 percent cobbles; 0.05 percent stones on surface; strongly acid (pH 5.1); clear wavy boundary.
E/Bt—5 to 14 inches; E part (75 percent) is light brownish gray (10YR 6/2) stony loam, dark brown (7.5YR 3/3) moist tongues; Bt part (25 percent) is pale brown (10YR 6/3) stony clay, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; hard, friable, slightly sticky and slightly plastic; many fine roots; continuous distinct clay films on faces of peds that are coated with clear unstained sand grains; 15 percent gravel; 5 percent cobbles; 10 percent stones; strongly acid (pH 5.2); clear wavy boundary.
Bt1—14 to 29 inches; pale brown (10YR 6/3) very stony clay, dark brown (10YR 3/3) moist; strong fine and medium blocky structure; very hard, firm, very sticky and very plastic; continuous prominent clay films on faces of peds; continuous prominent clay films on gravel surfaces; common fine roots; 20 percent gravel; 10 percent cobbles; 10 percent stones; moderately acid (pH 5.6); gradual wavy boundary.
Bt2—29 to 51 inches; pale brown (10YR 6/3) very stony clay, dark brown (10YR 3/3) moist; strong fine and medium blocky structure parting to moderate medium blocky in lower part; very hard, firm, very sticky and very plastic; common fine roots; continuous prominent clay films on faces of peds; continuous prominent clay films on surfaces of gravel; 20 percent gravel; 10 percent cobbles; 10 percent stones; slightly acid (pH 6.4); gradual wavy boundary.
Bt3—51 to 68 inches; grayish brown (10YR 5/2) stony clay, dark grayish brown (10YR 4/2) moist; very weak fine and medium blocky structure; very hard, firm, very sticky and very plastic; common fine roots; common faint clay films on faces of peds; common distinct clay films on surfaces of gravel; 25 percent gravel; 15 percent cobbles; 10 percent stones; slightly alkaline (pH 7.4); abrupt smooth boundary.
BC—68 to 72 inches; dark grayish brown (10YR 5/2) stony clay, very dark grayish brown (10YR 3/2) moist; massive; very hard, firm, very sticky and very plastic; continuous faint clay film on surfaces of gravel; 25 percent gravel; 5 percent cobbles; 10 percent stones; few fine pores; slightly alkaline (pH 7.8).

Lowder Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive, nonacid Typic Cryaquepts

Typical Pedon

Lowder very cobbly loam (Colors are for moist soil unless otherwise noted.)

Oe—2 inches to 0; very dark brown (10YR 2/2) cobbly mucky-peat, very dark gray (10YR 3/1) dry; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; 10 percent gravel; 5 percent cobbles; moderately acid (pH 6.0); abrupt smooth boundary.

A—0 to 2 inches; black (10YR 2/1) cobbly mucky-loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 10 percent gravel; 5 percent cobbles; slightly acid (pH 6.2); abrupt smooth boundary.

Bg1—2 to 7 inches; very dark grayish brown (10YR 3/2) very cobbly sandy clay loam, grayish brown (10YR 5/2) dry; common medium faint dark gray (5Y 4/1) redox depletions; moderate medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 25 percent gravel; 20 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

Bg2—7 to 12 inches; dark grayish brown (10YR 4/2) very cobbly sandy clay loam, light brownish gray (10YR 6/2) dry; common medium faint dark gray (5Y 4/1) redox depletions and few fine faint reddish yellow (7.5YR 6/6) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few coarse roots; many very fine and fine interstitial pores; 20 percent gravel; 25 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

Bg3—12 to 21 inches; dark grayish brown (2.5Y 4/2) very cobbly coarse sandy loam, light brownish gray (10YR 6/2) dry; few medium faint very dark gray (5Y 3/1) redox depletions and common fine distinct reddish yellow (7.5YR 6/6) redox concentrations; massive; hard, firm, slightly sticky and slightly plastic; common very fine and fine and few coarse roots; many very fine and fine tubular pores; 25 percent gravel; 20 percent cobbles; slightly acid (pH 6.4); gradual irregular boundary.

Bg4—21 to 33 inches; dark brown (10YR 3/3) very gravelly sandy clay loam, light olive brown (2.5Y 5/4) dry; common distinct very dark gray (5Y 3/1) redox depletions, many distinct strong brown (7.5YR 5/8) redox concentrations; massive; hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; 35 percent gravel; 15 percent cobbles; slightly acid (pH 6.4); gradual irregular boundary.

BCg—33 to 60 inches; brown (10YR 4/3) very gravelly sandy clay loam, light olive brown (2.5Y 5/4) dry; common medium distinct very dark gray (5Y 3/1) redox depletions, few fine distinct strong brown (7.5YR 5/8) redox concentrations; massive; very hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; 40 percent gravel; 15 percent cobbles; neutral (pH 6.6).

Maciver Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Maciver loam (Colors are for dry soil unless otherwise noted.)

A—0 to 7 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and

fine and few medium roots; few very fine and fine tubular pores; 10 percent gravel; neutral (pH 7.2); gradual wavy boundary.

Bt—7 to 11 inches; yellowish brown (10YR 5/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; few very fine and fine tubular pores; few faint clay films on faces of peds; 35 percent gravel; 5 percent cobbles; neutral (pH 7.2); clear smooth boundary.

Bk1—11 to 23 inches; pale yellow (2.5Y 7/4) very gravelly clay loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and moderately plastic; many very fine and fine roots; few very fine and fine tubular pores; 35 percent gravel; 5 percent cobbles; many medium segregated masses of lime; violently effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.

Bk2—23 to 30 inches; light yellowish brown (2.5Y 6/4) very gravely clay loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; 35 percent gravel; 10 percent cobbles; many medium segregated masses of lime; violent effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.

Bk3—30 to 60 inches; pale brown (10YR 6/3) very gravely loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; 40 percent gravel; 15 percent cobbles; many medium segregated masses of lime; violently effervescent; moderately alkaline (pH 8.2).

Marcetta Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical Pedon

Marcetta gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 10 inches; dark gray (7.5YR 4/1) gravelly loam, black (7.5YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 30 percent gravel; neutral; gradual wavy boundary.

A2—10 to 17 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; 30 percent gravel; neutral; gradual wavy boundary.

A3—17 to 25 inches; brown (10YR 5/3) very gravelly loam, dark brown with streaks of very dark brown (10YR 3/3) and very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; 40 percent gravel; neutral; gradual wavy boundary.

E—25 to 33 inches; light gray (10YR 7/2) very gravelly loam, dark grayish brown (7.5YR 4/2) moist; weak coarse subangular blocky structure; common fine pores; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common fine tubular pores; 50 percent gravel; neutral; gradual wavy boundary.

E/B—33 to 48 inches; light gray (10YR 7/2) and very pale brown (10YR 7/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; sand grains clear and unstained with few patches of clay film and clay flow; few very fine roots; common fine tubular pores; 55 percent gravel; neutral; gradual wavy boundary.

C—48 to 70 inches; light gray (10YR 7/2) extremely gravelly loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 65 percent coarse fragments including angular fragments ranging from gravel to stone size; neutral.

Maurice Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Maurice gravelly loam, in an area of Monaberg-Maurice, bouldery-Barbarela complex, 4 to 15 percent slopes in rangeland, Beaverhead County, Montana, approximately 450 feet north and 1,950 feet west of the SE corner of sec. 33, T. 1 N., R.15 W. Pintler Lake topographic quadrangle, UTM 12T, 0307819e, 5072900n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark gray (10YR 3/1) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, few fine, and medium roots; 20 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

A2—6 to 15 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, few fine, and medium roots; 20 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bw—15 to 34 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; 55 percent gravel; 10 percent cobbles; neutral (pH 6.7); clear wavy boundary.

BC—34 to 60 inches; very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; 35 percent gravel; 10 percent cobbles; neutral (pH 6.8).

Maybee Series

Taxonomic Class: Loamy-skeletal over sandy or sandy-skeletal, mixed, superactive Oxyaquic Argicryolls

Typical Pedon

Maybee silt loam, in an area of Cowcamp-Maybee complex, 0 to 2 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, 700 feet south and 1,700 feet east of the NW corner of sec. 36, T. 2 S., R. 17 W. Isaac Meadows topographic quadrangle, UTM 12T, 0293304e, 5055378n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—2 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; few fine faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine

and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

A2—7 to 12 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; few fine faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and fine dendritic tubular pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt1—12 to 21 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 4/3) moist; few fine faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common distinct patchy clay films on faces of peds; 35 percent gravel; 10 percent cobbles; neutral (pH 6.7); clear wavy boundary.

Bt2—21 to 27 inches; light yellowish brown (10YR 6/4) very cobbly sandy clay loam, yellowish brown (10YR 5/4) moist; few fine faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; few very fine and few fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films between sand grains and few faint patchy clay films on faces of peds; 35 percent gravel; 20 percent cobbles; neutral (pH 6.8); clear wavy boundary.

2C—27 to 60 inches; light yellowish brown (2.5Y 6/4) very cobbly loamy sand; light olive brown (2.5Y 5/4) moist; few fine faint strong brown (7.5YR 4/6) moist redox concentrations (due to prolonged saturation from flood irrigation); single grain; loose, nonsticky and nonplastic; 35 percent gravel; 20 percent cobbles; neutral (pH 7.2).

Monaberg Series

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

Typical Pedon

Monaberg silt loam, in an area of Hooligan-Monaberg complex, 2 to 15 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,250 feet north and 2,500 feet west of the SE corner of sec. 13, T. 3 S., R. 15 W. Wisdom topographic quadrangle, UTM 12T, 312876e, 5049138n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

A2—5 to 11 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—11 to 37 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine and few fine

dendritic tubular pores; common distinct patchy clay films on faces of peds; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

Bt2—37 to 45 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine and few fine dendritic tubular pores; few faint patchy clay films on faces of peds; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

BC1—45 to 52 inches; yellow (10YR 7/6) gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; 20 percent gravel; neutral (pH 7.1); clear wavy boundary.

BC2—52 to 60 inches; very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/4) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; 25 percent gravel; 5 percent cobbles; neutral (pH 7.1).

Monad Series

Taxonomic Class: Fine-loamy, mixed, superactive Alfic Argicryolls

Typical Pedon

Monad loam, in an area of Libeg, stony-Monad complex, 4 to 15 percent slopes, in rangeland, Beaverhead County, Montana, approximately 25 feet north and 600 feet east of the SW corner of sec. 15, T. 7 S., R. 14 W. Peterson Lake topographic quadrangle, UTM 12T, 318284e, 5009958n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 7 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

A2—7 to 15 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt/E—15 to 20 inches; Bt part (60 percent) is brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; E part (40 percent) is gray (10YR 6/1) loam, dark gray (10YR 4/1) moist; weak medium prismatic structure; very hard, friable, moderately sticky and moderately plastic; common fine roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds; 10 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

Bt1—20 to 29 inches; yellowish brown (10YR 5/6), gravelly clay loam, dark yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine and few fine dendritic tubular pores; many prominent continuous clay films on faces of peds; 20 percent gravel; moderately acid (pH 5.8); gradual wavy boundary.

Bt2—29 to 60 inches; yellowish brown (10YR 5/6), gravelly clay loam, dark yellowish brown (10YR 4/6) moist; strong medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine roots; common very fine and few fine dendritic tubular pores; many distinct continuous clay films on faces of peds; 25 percent gravel; moderately acid (pH 5.6).

Mooseflat Series

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaquolls

Typical Pedon

Mooseflat silty clay loam, in an area of Foxgulch-Mooseflat-Copperbasin complex, 0 to 4 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, approximately 1,200 feet south and 700 feet east of the NW corner of sec. 17, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 0315438e, 5020857n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 4 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A—4 to 14 inches; dark grayish brown (10YR 4/2) silty clay loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine and common fine roots; neutral (pH 6.6); clear wavy boundary.

Cg1—14 to 19 inches; gray (5Y 6/1) silt loam, dark gray (5Y 4/1) moist; common fine and medium faint irregular yellowish brown (10YR5/4) redox concentrations and few fine and medium faint irregular greenish gray (10Y 5/1) redox depletions; massive; moderately hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; neutral (pH 6.8); clear wavy boundary.

Cg2—19 to 25 inches; gray (5Y 6/1) gravelly loam, gray (5Y 5/1) moist; common fine and medium faint irregular greenish gray (10Y 5/1) redox depletions; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; 15 percent gravel; 5 percent cobbles; neutral (pH 7.0); clear wavy boundary.

2Cg3—25 to 60 inches; grayish brown (2.5Y 5/2) extremely cobbly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; 35 percent gravel; 30 percent cobbles; slightly acid (pH 6.5).

Mussigbrod Series

Taxonomic Class: Fine-loamy, mixed, superactive Cumulic Haplocryolls

Typical Pedon

Mussigbrod loam, in an area of Briston-Mussigbrod complex, 0 to 2 percent slopes, in rangeland, Beaverhead County, Montana, approximately 500 feet north and 1,500 feet west of the SE corner of sec. 15, T. 2 S., R. 16 W. Gibbons School topographic quadrangle, UTM 12T, 300519e, 5058898n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine and medium platy structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2—3 to 8 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine tubular pores; 5 percent gravel; very slightly effervescent; neutral (pH 7.2); clear wavy boundary.

A3—8 to 17 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine and few medium roots;

many very fine and fine tubular pores; 5 percent gravel; slightly effervescent; slightly alkaline (pH 7.5); gradual wavy boundary.

Bk—17 to 27 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine, fine, and medium roots; common medium pores; many soft masses of lime and coats on rock fragments; 10 percent gravel; strongly effervescent; slightly alkaline (pH 7.8); gradual wavy boundary.

Ab—27 to 38 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, slightly sticky and nonplastic; few very fine roots; many very fine tubular pores; 5 percent gravel; disseminated lime throughout; slightly effervescent; slightly alkaline (pH 7.6); gradual wavy boundary.

Bwb—38 to 49 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; 10 percent gravel; slightly alkaline (pH 7.6); gradual wavy boundary.

2C—49 to 60 inches; very pale brown (10YR 7/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; 65 percent gravel; neutral (pH 7.1).

Nana Series

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaqualfs

Typical Pedon

Nana loam, in an area of Zelda-Nana-Foolhen complex, 0 to 2 percent slopes, in rangeland, Deer Lodge County, Montana, 250 feet east and 2,200 feet south of the NW corner of sec. 33, T. 1 N., R. 14 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/1) dry; weak fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; strongly alkaline; clear smooth boundary.

E—6 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; slightly effervescent; very strongly alkaline; abrupt smooth boundary.

Btn1—8 to 16 inches; very dark gray (10YR 3/1) clay loam, grayish brown (10YR 5/2) dry; strong medium columnar structure parting to strong medium angular blocky; very hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine tubular pores; common faint clay films on faces of peds; common grayish brown (10YR 5/2) and light gray (10YR 7/2) dry tongues of albic materials on upper vertical faces of peds; very strongly alkaline; clear smooth boundary.

Btn2—16 to 20 inches; dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; strong medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; common very fine tubular pores; common faint clay films on faces of peds; very strongly alkaline; clear smooth boundary.

2Cn1—20 to 26 inches; brown (10YR 5/3) loamy fine sand, light brownish gray (10YR 6/2) dry; single grain; loose, slightly sticky and nonplastic; common very fine roots;

few medium tubular pores; 10 percent gravel; very strongly alkaline; clear smooth boundary.

2Cn2—26 to 60 inches; dark grayish brown (10YR 4/2) gravelly coarse sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine roots; common medium interstitial pores; 20 percent gravel; 5 percent cobbles; very strongly alkaline.

Nieman Series

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

Typical Pedon

Nieman very cobbly loam, extremely stony, in an area of Nieman, extremely stony-Sebud, very stony complex, 15 to 45 percent slopes, in rangeland, Beaverhead County, Montana, approximately 2,550 feet south and 2,400 feet west of the NW corner of sec. 11, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 320818e, 5021916n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine and fine dendritic tubular pores; 30 percent gravel; 20 percent cobbles; neutral (pH 6.6); gradual wavy boundary.

Bt—5 to 12 inches; light brown (7.5YR 6/4) extremely cobbly sandy clay loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine and few fine dendritic tubular pores; common faint patchy clay films on faces of peds and many faint discontinuous clay films on rock fragments; 40 percent gravel; 25 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

BC—12 to 16 inches; light brown (7.5YR 6/3) extremely cobbly sandy clay loam, brown (7.5YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine irregular pores; 50 percent gravel; 30 percent cobbles; moderately acid (pH 6.0).

R--16 to 60 inches; hard quartzite bedrock.

Petty Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Eutrocryepts

Typical Pedon

Petty gravelly ashy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches; undecomposed and slightly decomposed forest litter.

Bw—3 to 15 inches; light yellowish brown (10YR 6/4) gravelly ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine pores; 20 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

2E—15 to 27 inches; very pale brown (10YR 7/4) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine pores; 35 percent gravel; 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2E and Bt—27 to 39 inches; E part (70 percent) is very pale brown (10YR 7/4) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; B part (30 percent) is strong brown (7.5YR 5/6) fine sandy loam lamellae 1/8- to 1/2-inch thick, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine pores; 45 percent gravel; 10 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

2C—39 to 60 inches; very pale brown (10YR 7/4) extremely gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine and fine pores; 50 percent gravel; 15 percent cobbles; slightly acid (pH 6.4).

Philipsburg Series

Taxonomic Class: Fine-loamy, mixed, superactive Calcic Argicryolls

Typical Pedon

Philipsburg silt loam, 2 to 8 percent slopes, in rangeland, Beaverhead County, Montana, approximately 950 feet west and 1,550 feet south of the NE corner of sec. 28, T. 4 S., R. 15 W. Fox Gulch topographic quadrangle, UTM 12T, 308264e, 5036779n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

A2—5 to 14 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

Bt1—14 to 20 inches; brown (10YR 5/3), silty clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; many distinct patchy clay films on faces of peds; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt2—20 to 32 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; common distinct patchy clay films on faces of peds; 10 percent gravel; neutral (pH 6.8); gradual wavy boundary.

Bk1—32 to 43 inches; very pale brown (10YR 8/4), gravelly loam, very pale brown (10YR 7/4) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; 25 percent gravel; disseminated lime; common fine and medium soft masses of lime; many distinct continuous lime coats on rock fragments; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—43 to 60 inches; very pale brown (10YR 8/3), very gravelly sandy loam, very pale brown (10YR 7/3) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; common very fine

irregular pores; 35 percent gravel; 15 percent cobbles; disseminated lime; common fine and medium soft masses of lime; many distinct continuous lime coats on rock fragments; violently effervescent; moderately alkaline (pH 8.0).

Plimpton Series

Taxonomic Class: Fine-loamy, mixed, superactive Oxyaquic Argicryolls

Typical Pedon

Plimpton silt loam, in an area of Plimpton-Cowcamp complex, 2 to 8 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, 50 feet south and 1,600 feet west of the NE corner of sec. 28, T. 1 S., R. 16 W. Gibbons School topographic quadrangle, UTM 12T, 0299011e, 5066860n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—1 to 9 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; few fine faint dark brown (7.5YR 3/3) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; 5 percent gravel; slightly alkaline (pH 7.6); gradual wavy boundary.

A2—9 to 19 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; few fine faint dark brown (7.5YR 3/3) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.8); gradual wavy boundary.

Bt—19 to 38 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; few fine faint brown (7.5YR 4/3) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate medium prismatic structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; many very fine and fine dendritic tubular pores; common distinct continuous clay films on faces of peds and common faint patchy clay films between sand grains; 10 percent gravel; neutral (pH 6.7); clear wavy boundary.

BC—38 to 60 inches; very pale brown (10YR 8/2) gravelly sandy clay loam, light brownish gray (10YR 6/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; 20 percent gravel; neutral (pH 6.7).

Poin Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryolls

Typical Pedon

Poin sandy loam, in an area of Barbarela-Poin complex, 4 to 15 percent slopes, in rangeland, Beaverhead County, Montana, 500 feet west and 300 feet north of the SE corner of sec. 27, T. 1 N., R. 14 W. Pinehill topographic quadrangle, UTM 12T, 319868e, 5074428n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky

and nonplastic; many very fine and fine roots; 5 percent gravel; slightly acid; abrupt smooth boundary.
A2—4 to 8 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 20 percent gravel; slightly acid; clear smooth boundary.
Bw—8 to 16 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 45 percent gravel; neutral; clear wavy boundary.
C—16 to 19 inches; light yellowish brown (10YR 6/3) extremely channery loamy sand, brown (10YR 5/3) moist; massive; loose; nonsticky and nonplastic; common very fine and fine roots; 90 percent channers; neutral; abrupt wavy boundary.
R--19 inches; fractured gneiss and granodiorite bedrock.

Proposal Series

Taxonomic Class: Fine-loamy, mixed, superactive Oxyaquic Haplocryolls

Typical Pedon

Proposal silt loam, 0 to 2 percent slopes, in irrigated grass hay, Beaverhead County, Montana, approximately 700 feet south and 500 feet west of the NE corner of sec. 28, T. 3 S., R. 15 W. Wisdom topographic quadrangle, UTM 12T, 308720e, 5047096n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.
A1—2 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; few fine faint brownish yellow (10YR 6/6) moist redox concentrations (due to prolonged saturation from flood irrigation); weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; neutral (pH 6.8); clear smooth boundary.
A2—8 to 16 inches; grayish brown (10YR 5/2) silt loam, dark brown (10YR 3/3) moist; few fine faint brownish yellow (10YR 6/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; neutral (pH 7.0); clear wavy boundary.
Bw1—16 to 28 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 4/4) moist; common fine faint yellowish brown (10YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate coarse subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and few fine dendritic tubular pores; 5 percent gravel; slightly alkaline (pH 7.4); clear wavy boundary.
Bw2—28 to 45 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 4/3) moist; few fine faint yellowish brown (10YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate coarse subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and few fine dendritic tubular pores; 5 percent gravel; slightly alkaline (pH 7.6); clear wavy boundary.
Bk—45 to 60 inches; light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine roots; 10 percent gravel; disseminated

lime and many fine and medium patchy soft masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.2).

Ratiopeak Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Ratiopeak gravelly loam, in an area of Ratiopeak, bouldery-Poin, flaggy complex, 15 to 45 percent slopes, in rangeland, Dillon Area—Part of Beaverhead County, Montana, 1,500 feet north and 1,200 feet east of the SW corner of sec. 6, T. 4 S., R. 9 W. Storm Peak topographic quadrangle, UTM 12T, 361838e, 5041623n. NAD83. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; 20 percent gravel; 5 percent cobbles; neutral; clear smooth boundary.

Bt1—8 to 15 inches; light olive brown (2.5Y 5/3) extremely cobbly loam, dark olive brown (2.5Y 3/3) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine and medium roots; common faint patchy clay films on faces of peds and between sand grains; common faint continuous clay films on rock fragments; 35 percent gravel; 30 percent cobbles; neutral; clear smooth boundary.

Bt2—15 to 25 inches; light olive brown (2.5Y 5/4) extremely cobbly sandy clay loam, olive brown (2.5Y 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine and medium roots; common faint patchy clay films on faces of peds, between sand grains, and on rock fragments; 40 percent gravel; 25 percent cobbles; neutral; clear wavy boundary.

Bk—25 to 60 inches; light brownish gray (2.5Y 6/2) extremely cobbly sandy loam, light olive brown (2.5Y 5/3) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; 25 percent gravel; 40 percent cobbles; disseminated lime; few fine and medium soft masses of lime; common distinct lime casts on undersides of rock fragments; violently effervescent; moderately alkaline.

Redfish Series

Taxonomic Class: Sandy-skeletal, mixed Typic Cryaquolls

Typical Pedon

Redfish gravelly loam, in an area of Redfish-Slagamelt-Shewag complex, 0 to 4 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, approximately 2,400 feet south and 1,800 feet east of the NW corner of sec. 17, T. 4 S., R. 16 W., Ajax Ranch topographic quadrangle, UTM 12T, 296167e, 5040170n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 4 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A—4 to 11 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; few patchy distinct dark yellowish brown (10YR 4/4) moist redox concentrations; weak fine and medium subangular blocky structure parting to weak very fine and fine

granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine dendritic tubular pores; 20 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Ag—11 to 16 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; many patchy distinct light yellowish brown (10YR 6/4) moist redox concentrations; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and common fine roots; common very fine dendritic tubular pores; 35 percent gravel; 15 percent cobbles; neutral (pH 6.6); clear wavy boundary.

2Cg—16 to 60 inches; white (5GY 8/) extremely gravelly loamy coarse sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 45 percent gravel; 20 percent cobbles; neutral (pH 6.6).

Relyea Series Family

Taxonomic Class: Clayey-skeletal, mixed, superactive Eutric Glossocryalfs

Typical Pedon

Relyea gravelly loam (Colors are for dry soil unless otherwise noted.)

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

E—0 to 3 inches; light reddish brown (5YR 6/3) gravelly loam, reddish brown (5YR 4/3) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine and common medium and coarse roots; many very fine and fine discontinuous irregular and few very fine discontinuous tubular pores; 25 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bt/E—3 to 6 inches; Bt part (80 percent) is reddish brown (5YR 4/4) very gravelly clay loam, dark reddish gray (5YR 4/2) moist; E part (20 percent) is light reddish brown (5YR 6/3) very gravelly loam, reddish brown (5YR 4/3) moist tongues; texture mixed is very gravelly clay loam; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and moderately plastic; many very fine, fine and common medium and coarse roots; many very fine and fine discontinuous irregular and many very fine discontinuous tubular pores; common faint clay films on faces of peds; 35 percent gravel; 5 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt—6 to 15 inches; reddish brown (5YR 4/4) very gravelly clay loam, dark reddish gray (5YR 4/2) moist; moderate fine subangular blocky structure; very hard, very firm, slightly sticky and moderately plastic; common very fine, fine, and coarse and many medium roots; many very fine and fine discontinuous irregular and many very fine discontinuous tubular pores; many distinct clay films on faces of peds; 30 percent gravel; 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Btk—15 to 28 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and moderately plastic; common very fine, fine, and medium and few coarse roots; many very fine and fine discontinuous irregular pores; few faint clay films on faces of peds; 35 percent gravel; 15 percent cobbles; disseminated lime; continuous faint and distinct lime casts on undersides of coarse fragments; strongly effervescent; moderately alkaline (pH 7.9); gradual wavy boundary.

Bk1—28 to 36 inches; pinkish gray (7.5YR 7/2) very gravelly loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine discontinuous irregular pores; 40 percent gravel; 20 percent cobbles; disseminated lime; continuous faint and distinct lime casts

covering coarse fragments; violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.

Bk2—36 to 60 inches; pinkish gray (7.5YR 7/2) extremely cobbly loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine discontinuous irregular pores; 40 percent gravel; 30 percent cobbles; disseminated lime; continuous faint and distinct lime casts covering coarse fragments; violently effervescent; moderately alkaline (pH 8.0).

Rogert Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryolls

Typical Pedon

Rogert very gravelly sandy loam, in an area of Barbarela-Rogert complex, 8 to 35 percent slopes in rangeland, Beaverhead County, Montana, approximately 1,950 feet south and 400 feet west of the NE corner of sec. 31, T. 2 S., R. 14 W. Stewart Mountain topographic quadrangle, UTM 12T, 315349e, 5054506n. NAD83 (Colors are for dry soil unless otherwise noted.)

A—0 to 7 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and nonplastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 35 percent gravel; neutral (pH 6.6); clear wavy boundary.

C—7 to 13 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine roots; common very fine and few fine dendritic tubular pores; 50 percent gravel; neutral (pH 6.7); clear wavy boundary.

R--13 to 60 inches; hard granite bedrock.

Rooset Series Family

Taxonomic Class: Clayey-skeletal, smectitic Ustic Argicryolls

Typical Pedon

Rooset gravelly loam (Colors are for dry soil unless otherwise noted.)

A—0 to 7 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong fine granular and crumb structure; soft, very friable; 15 percent gravel; neutral (pH 6.7); clear smooth boundary.

BA—7 to 11 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, very friable; 15 percent gravel; few faint clay films on faces of peds; neutral (pH 6.7); clear smooth boundary.

Bt—11 to 24 inches; brown (7.5YR 5/3) very gravelly clay loam, brown (7.5YR 4/3) moist; strong fine angular blocky structure; extremely hard, very friable; 50 percent gravel; continuous distinct clay films on faces of peds and on coarse fragments and fillings in root channels and pores; neutral (pH 6.8); clear wavy boundary.

Btk—24 to 30 inches; brown (7.5YR 5/3) very gravelly clay loam, brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; very hard, very friable; 75 percent gravel; faint clay films on faces of peds and in root channels; visible secondary calcium carbonate as concretions, in thin seams and streaks, and as

coats on gravel fragments; calcareous; moderately alkaline (pH 8.2); gradual wavy boundary.

BCk—30 to 60 inches; light brown (7.5YR 6/4) very gravelly light clay loam, brown (7.5YR 5/4) moist; massive; hard, very friable; 75 percent gravel; visible secondary calcium carbonate occurring as concretions, in thin seams and streaks, and as coats on gravel fragments; calcareous; moderately alkaline (pH 8.2).

Rubycreek Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Dystrocryepts

Typical Pedon

Rubycreek medial silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.5 inch; leaves, twigs, grass, moss, and bark.

A—0.5 to 2 inches; grayish brown (10YR 5/2) medial silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and few fine roots; common very fine tubular pores; 5 percent gravel; strongly acid (pH 5.5); abrupt smooth boundary.

Bw1—2 to 7 inches; yellowish brown (10YR 5/6) medial silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and few fine roots; common very fine tubular pores; 5 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bw2—7 to 11 inches; light yellowish brown (10YR 6/4) medial silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine roots; many very fine tubular pores; 5 percent gravel; 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2Bw3—11 to 19 inches; light yellowish brown (10YR 6/4) very stony loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; 10 percent gravel; 10 percent cobbles; 20 percent stones; slightly acid (pH 6.5); clear wavy boundary.

2Bt—19 to 28 inches; pale yellow (2.5Y 7/4) very cobbly loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; very few faint clay films on faces of peds; common faint and few distinct light brownish gray (10YR 6/2) moist silica coats on faces of peds; 10 percent gravel; 30 percent cobbles; slightly acid (pH 6.3); clear wavy boundary.

2C—28 to 60 inches; mixed pale yellow (2.5Y 7/4) and pale yellow (2.5Y 7/3) very cobbly sandy loam, light olive brown (2.5Y 5/4) and light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine tubular and irregular pores; few faint dark yellowish brown (10YR 4/6) moist clay films on gravel; small part of horizon is discontinuous weakly cemented by silica that is gray (10YR 6/1) moist; 25 percent gravel; 30 percent cobbles; slightly acid (pH 6.1).

Sebud Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Sebud gravelly loam, in an area of Nieman, extremely stony-Sebud, very stony complex, 15 to 45 percent slopes, in rangeland, Beaverhead County, Montana, approximately 1,850 feet north and 450 feet east of the SW corner of sec. 9, T. 7 S., R. 14 W. Peterson Lake topographic quadrangle, UTM 12T, 316641e, 5012191n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly loam, black (10YR 2/1) moist; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine dendritic tubular pores; 20 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

A2—5 to 11 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine dendritic tubular pores; 20 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

Bw1—11 to 22 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and common fine dendritic tubular pores; 35 percent gravel; 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

Bw2—22 to 37 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine dendritic tubular pores; 40 percent gravel; 15 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

C—37 to 60 inches; light gray (10YR 7/2) extremely gravelly sandy loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and common fine dendritic tubular pores; 55 percent gravel; 10 percent cobbles; moderately acid (pH 5.6).

Shewag Series

Taxonomic Class: Sandy-skeletal, mixed Oxyaquic Haplocryolls

Typical Pedon

Shewag very gravelly loam, in an area of Wisdom-Shewag complex, 0 to 4 percent slopes, in irrigated grass pasture, Beaverhead County, Montana, approximately 200 feet south and 1,250 feet east of the NW corner of sec. 18, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 314149e, 5021398n. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A—3 to 9 inches; dark gray (10YR 4/1) very gravelly loam, black (10YR 2/1) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 35 percent gravel; 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bw—9 to 18 inches; grayish brown (10YR 5/2) extremely gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; few fine faint yellowish brown (10YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; many very fine and few fine roots; many very fine and common fine dendritic tubular pores; 50 percent gravel; 15 percent cobbles; neutral (pH 7.0); clear wavy boundary.

2C—18 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; 50 percent gravel; 20 percent cobbles; neutral (pH 7.0).

Slagamelt Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Aquic Haplocryolls

Typical Pedon

Slagamelt cobbly silt loam, in an area of Redfish-Slagamelt-Shewag complex, 0 to 4 percent slopes, in an aspen grove, Beaverhead County, Montana, approximately 900 feet east and 2,300 feet north of the SW corner of sec. 6, T. 4 S., R. 16 W. Isaac Meadows topographic quadrangle, UTM 12T, 294270e, 5043291n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed matted roots, leaves, and twigs; abrupt smooth boundary.

A—1 to 7 inches; very dark grayish brown (10YR 3/2) cobbly silt loam, very dark brown (10YR 2/2) moist; few distinct brownish yellow (10YR 6/6) dry relict mottles; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; few very fine and fine dendritic tubular pores; 10 percent gravel; 15 percent cobbles; slightly acid (pH 6.2); clear smooth boundary.

Bw1—7 to 16 inches; brown (10YR 4/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine and fine dendritic tubular pores; 25 percent gravel; 25 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bw2—16 to 27 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine dendritic tubular pores; 35 percent gravel; 10 percent cobbles; neutral (pH 7.0); clear smooth boundary.

C—27 to 34 inches; light gray (10YR 7/2) very gravelly sandy loam, pale brown (10YR 6/3) moist; common distinct brownish yellow (10YR 6/6) dry redox concentrations; massive; soft, friable, nonsticky and nonplastic; 40 percent gravel; 15 percent cobbles; neutral (pH 7.2); gradual wavy boundary.

2C—34 to 60 inches; light gray (10YR 7/2) extremely gravelly sand, pale brown (10YR 6/3) moist; many distinct brownish yellow (10YR 6/6) dry redox concentrations; single grain; loose, nonsticky and nonplastic; 55 percent gravel; 15 percent cobbles; neutral (pH 7.2).

Stecum Series Family

Taxonomic Class: Sandy-skeletal, mixed Typic Cryorthents

Typical Pedon

Stecum coarse sandy loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 inches; light brownish gray (10YR 6/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak coarse granular; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine pores; 10 percent gravel; neutral (pH 7.3); clear smooth boundary.

A2—5 to 12 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to weak coarse granular; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 10 percent gravel; 5 percent cobbles; neutral (pH 7.3); clear wavy boundary.

C—12 to 28 inches; light gray (2.5Y 7/2) gravelly coarse sand, pale brown (10YR 6/3) moist; massive; loose, very friable, nonsticky and nonplastic; few fine roots; 35 percent gravel; 5 percent cobbles; 5 percent stones; neutral (pH 7.3); abrupt smooth boundary.

Cr—28 inches; fractured and partly weathered micaceous granite and gneiss.

Swifton Series Family

Taxonomic Class: Fine-loamy, mixed, superactive Typic Palecryalfs

Typical Pedon

Swifton gravelly sandy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed needles and matted dark-colored organic material.

E1—1 to 4 inches; light gray (10YR 7/2) gravelly sandy loam, grayish brown (10YR 5/2) moist; weak very thin platy structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; common fine and few medium tubular pores; 20 percent gravel; very strongly acid (pH 4.5); clear irregular boundary.

E2—4 to 16 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak very fine and fine blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; few fine tubular pores; 20 percent gravel; very strongly acid (pH 4.5); clear smooth boundary.

E3—16 to 23 inches; light gray (10YR 7/2), pale brown (10YR 6/3) crushed gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine and medium blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular pores; 20 percent gravel; very strongly acid (pH 4.5); clear smooth boundary.

E/B—23 to 38 inches; light gray (10YR 7/2) and grayish brown (10YR 5/2) gravelly sandy clay loam, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; about 40 percent of the mass is in a very fine mixed color pattern having skeletans of light gray clean silt and sand about 1-mm thick on outer walls of peds; moderate medium blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common fine tubular pores; 25 percent gravel; strongly acid (pH 5.5); gradual smooth boundary.

B/E—38 to 53 inches; light gray (10YR 7/2) gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; E horizon material dominates the color, but there are common medium distinct mottles of yellowish brown (10YR 5/4) and skeletans of light gray clean silt and sand about 1-mm thick on outer walls of peds; moderate medium blocky structure; very hard, friable, moderately sticky and moderately

plastic; few fine roots; few fine tubular pores; 30 percent gravel; moderately acid (pH 6.0); clear smooth boundary.
Bt—53 to 73 inches; yellowish brown (10YR 5/4) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium blocky structure; very hard, friable, moderately sticky and moderately plastic; few fine roots; few fine tubular pores; 40 percent rock fragments; distinct clay films on rock fragments, in pores, and along root channels; slightly alkaline (pH 7.5).

Tepecreek Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryalfs

Typical Pedon

Tepecreek very gravelly sandy clay loam (Colors are for dry soil unless otherwise noted.)

Oi—1 inch to 0; partially decomposed needles, twigs, and leaves.
A—0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine and few medium pores; 35 percent gravel; slightly acid (pH 6.3); clear smooth boundary.
E—2 to 8 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine and few medium pores; 40 percent gravel; slightly acid (pH 6.2); clear smooth boundary.
Bt—8 to 18 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; many very fine and few fine and medium roots; many very fine and few fine interstitial and tubular pores; many faint clay films bridging sand grains; 40 percent gravel; slightly acid (pH 6.1); clear wavy boundary.
BC—18 to 35 inches; olive brown (2.5Y 4/4) very gravelly sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine and few fine roots; many very fine and few fine interstitial and tubular pores; 55 percent gravel; neutral (pH 6.6); clear wavy boundary.
Cr—34 to 52 inches; light olive brown (2.5Y 5/4) decomposed granite bedrock (grus) that crushes to very gravelly loamy coarse sand; slightly acid (pH 6.4); gradual wavy boundary.
R--52 inches; hard granite bedrock.

Tepete Series

Taxonomic Class: Loamy, mixed, euic Terric Cryohemists

Typical Pedon

Tepete mucky peat, in an area of Tepete-Dunkleber-Mooseflat complex, 0 to 2 percent slopes, in rangeland, Beaverhead County, Montana, approximately 300 feet north and 2,500 feet west of the SE corner of sec. 16, T. 4 S., R. 16 W. Ajax Ranch topographic quadrangle, UTM 12T, 297812e, 5039262n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oe1—0 to 7 inches; very dark brown (10YR 2/2) mucky peat, black (10YR 2/1) moist; about 60 percent fiber and raw herbaceous material, 40 percent rubbed; weak very thin and thin platy structure; nonsticky and nonplastic; strongly acid (pH 5.4); abrupt smooth boundary.

Oe2—7 to 26 inches; very dark grayish brown (10YR 3/2) mucky peat, black (10YR 2/1) moist; about 90 percent fiber and raw herbaceous material, 60 percent rubbed; moderate thin and medium platy structure; nonsticky and nonplastic; strongly acid (pH 5.4); abrupt smooth boundary.

Oe3—26 to 40 inches; very dark brown (10YR 2/2) mucky peat, black (10YR 2/1) moist; about 70 percent fiber and raw herbaceous material, 50 percent rubbed; massive; nonsticky and nonplastic; strongly acid (pH 5.2); clear smooth boundary.

Ag—40 to 50 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; few very fine prominent dark yellowish brown (10YR 4/6) moist redox concentrations; moderate very thin and thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; strongly acid (pH 5.2); clear smooth boundary.

2Cg—50 to 60 inches; grayish brown (10YR 5/2) very gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; many medium distinct yellowish brown (10YR 5/8) redox concentrations; weak fine and medium subangular blocky structure: slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; 35 percent gravel; 10 percent cobbles; strongly acid (pH 5.2).

Tiban Series

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Tiban very cobbly loam, in an area of Libeg-Tiban, stony complex, 8 to 35 percent slopes, in rangeland, Beaverhead County, Montana, approximately 3,150 feet west and 2,000 feet south of the NE corner of sec. 7, T. 6 S., R. 14 W. Butch Hill topographic quadrangle, UTM 12T, 314015e, 5021953n. NAD83 (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; gray (10YR 5/1) very cobbly loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 30 percent gravel; 20 percent cobbles; neutral (pH 6.8); clear smooth boundary.

A2—3 to 7 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine dendritic tubular pores; 35 percent gravel; 15 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

Bw1—7 to 17 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; 45 percent gravel; 10 percent cobbles; neutral (pH 7.1); gradual wavy boundary.

Bw2—17 to 24 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak very fine and fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; 40 percent gravel; 20 percent cobbles; neutral (pH 7.2); gradual wavy boundary.

Bk—24 to 60 inches; very pale brown (10YR 8/2) extremely gravelly loam, light gray (10YR 7/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; 50 percent gravel; 20 percent cobbles; disseminated lime; continuous irregular soft masses and threads throughout;, many continuous calcium carbonate coats on undersides of rock fragments; violently effervescent; moderately alkaline (pH 7.9).

Upsata Series Family

Taxonomic Class: Sandy-skeletal, mixed Andic Eutrocryepts

Typical Pedon

Upsata ashy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E—2 to 4 inches; pinkish gray (7.5YR 7/2) ashy loam, brown (7.5YR 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine pores; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
Bw—4 to 15 inches; light yellowish brown (10YR 6/4) gravelly ashy fine sandy loam, brown (7.5YR 4/4) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine pores; 20 percent gravel; moderately acid (pH 5.7); clear wavy boundary.
2C1—15 to 42 inches; pinkish gray (7.5YR 6/2) extremely gravelly loamy coarse sand, brown (7.5YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine, and medium roots; 50 percent gravel; 20 percent cobbles; moderately acid (pH 5.8); gradual smooth boundary.
2C2—42 to 60 inches; pink (5YR 7/3) extremely gravelly loamy coarse sand, reddish gray (5YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine and fine pores; 50 percent gravel; 20 percent cobbles; moderately acid (pH 5.9).

Waldbillig Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Andic Eutrocryepts

Typical Pedon

Waldbillig gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
Bw—2 to 12 inches; light brown (7.5YR 6/4) gravelly ashy silt loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 25 percent gravel; moderately acid (pH 5.6); clear wavy boundary.
2E—12 to 28 inches; pink (5YR 7/3) very gravelly fine sandy loam, reddish brown (5YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; many fine pores; 30 percent gravel; 10 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
2E and Bt—28 to 60 inches; E part (75 percent) is light reddish brown (5YR 6/3) very gravelly fine sandy loam, reddish brown (5YR 5/4) moist; B part (25 percent) is reddish brown (5YR 5/4) very fine sandy loam lamellae 1/4- to 1/2-inch thick, dark reddish brown (5YR 3/4) moist; texture mixed is very gravelly fine sandy loam; weak medium subangular blocky structure; very hard, very friable, nonsticky and

nonplastic; few fine roots; many fine pores; 35 percent gravel; 15 percent cobbles; neutral (pH 6.9).

Wetopa Series Family

Taxonomic Class: Fine, smectitic Vertic Argicryolls

Typical Pedon

Wetopa clay loam (Colors are for dry soil unless otherwise noted.)

A—0 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; soft, friable, slightly sticky and slightly plastic; slightly acid (pH 6.2); clear smooth boundary.

BA—10 to 18 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; 5 percent rock fragments; slightly acid (pH 6.4); clear smooth boundary.

Bt—18 to 34 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 4/3) moist; strong medium angular blocky structure; hard, firm, moderately sticky and moderately plastic; 10 percent rock fragments; moderately acid (pH 6.0); clear wavy boundary.

BC—34 to 60 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; moderately acid (pH 6.0).

Whitore Series Family

Taxonomic Class: Loamy-skeletal, carbonatic Typic Eutrocryepts

Typical Pedon

Whitore channery loam (Colors are for dry soil unless otherwise noted.)

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

A—2 to 5 inches; dark grayish brown (10YR 4/2) channery loam, very dark gray (10YR 3/1) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common fine and medium pores; 25 percent channers; slightly alkaline (pH 7.4); clear irregular boundary.

Bw—5 to 14 inches; pale brown (10YR 6/3) channery loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine pores; 25 percent channers; disseminated lime; slightly effervescent; slightly alkaline (pH 7.4); gradual smooth boundary.

Bk1—14to 25 inches; light gray (10YR 7/2) very channery loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots, some forming horizontal root mats on rock fragments; 50 percent channers; common distinct lime casts on surfaces of rock fragments and pendants on undersides of rock fragments; disseminated lime; violently effervescent; strongly alkaline (pH 9.0); gradual wavy boundary.

Bk2—25 to 60 inches; very pale brown (10YR 8/2) extremely channery loam, light brownish gray (10YR 6/2) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots, some forming horizontal root mats on fragments; 60 percent channers; many distinct lime casts on surfaces of

rock fragments and pendants on undersides of rock fragments; disseminated lime; violently effervescent; strongly alkaline (pH 9.0); gradual wavy boundary.

Wichup Series Family

Taxonomic Class: Coarse-loamy, mixed, superactive Histic Cryaquolls

Typical Pedon

Wichup peat (Colors are for dry soil unless otherwise noted.)

O1—0 to 5 inches; brown, calcareous fibrous sedge-rush peat; effervescence in upper 2 inches; slightly alkaline (pH 7.8); gradual smooth boundary.

O2—5 to 10 inches; black, calcareous muck with some plant residue forms and some mineral matter; neutral (pH 6.8); gradual wavy boundary.

A1g—10 to 18 inches; gray (2.5Y 5/1) gravelly loam, black (2.5Y 2/1) moist; common medium distinct brown (7.5YR 4/4) moist mottles; moderate fine granular structure; soft, very friable; slightly alkaline (pH 7.4); gradual wavy boundary.

B21g—18 to 24 inches; light brownish gray (2.5Y 6/2) very gravelly loam, dark grayish brown (2.5Y 4/2) moist; many large prominent dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; slightly hard, very friable; slightly alkaline (pH 7.4); gradual wavy boundary.

B22g—24 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; common medium distinct olive brown (2.5Y 4/3) and dark brown (10YR 4/3) mottles; massive; slightly hard, very friable; 10 percent gravel; slightly alkaline (pH 7.4).

Wisdom Series

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Oxyaquic Haplocryolls

Typical Pedon

Wisdom silt loam, in an area of Wisdom-Shewag complex, 0 to 4 percent slopes, in irrigated grass hay, Beaverhead County, Montana, approximately 900 feet north and 50 feet east of the SW corner of sec. 9, T. 4 S., R. 15 W. Fox Gulch topographic quadrangle, UTM 12T, 306976e, 5041012n. NAD83 (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and partially decomposed matted roots; abrupt smooth boundary.

A1—2 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine and fine dendritic tubular pores; neutral (pH 7.2); clear wavy boundary.

A2—7 to 14 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine and fine dendritic tubular pores; neutral (pH 6.7); clear wavy boundary.

Bw—14 to 27 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; common fine faint yellowish brown (10YR 5/6) moist redox concentrations (due to prolonged saturation from flood irrigation); weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, moderately sticky and slightly plastic; common very fine and few fine roots; common very fine

and few fine dendritic tubular pores; 5 percent gravel; neutral (pH 6.7); clear wavy boundary.

2C—27 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; 45 percent gravel; 20 percent cobbles; neutral (pH 6.8).

Woodhurst Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Pachic Argicryolls

Typical Pedon

Woodhurst stony loam, in native grass (Colors are for dry soil unless otherwise noted.)

A—0 to 12 inches; very dark grayish brown (10YR 3/2) stony loam, very dark brown (10YR 2/2) moist; weak fine crumb structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many fine interstitial pores; 20 percent stones; noncalcareous; slightly alkaline (pH 7.6); clear wavy boundary.

Bt1—12 to 20 inches; dark grayish brown (10YR 4/2) very stony clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine blocky structure parting to very fine granular with weathered igneous rock fragments that crush easily in the hand; soft, friable, moderately sticky and moderately plastic; many very fine roots; many fine tubular pores; continuous distinct clay films on vertical faces of peds and patchy clay films on horizontal faces of peds with organically stained glossy films on weathered rock fragments; 50 percent rock fragments; slightly alkaline (pH 7.8); clear wavy boundary.

Bt2—20 to 60 inches; brown (10YR 4/3) extremely stony clay loam, dark brown (10YR 3/3) moist; moderate fine and medium blocky structure; slightly hard, friable, moderately sticky and moderately plastic; few very fine roots; distinct continuous clay films on all faces of peds; moderately alkaline (pH 8.3); noncalcareous; 80 percent rock fragments; clear wavy boundary.

Worock Series Family

Taxonomic Class: Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

Typical Pedon

Worock gravelly loam (Colors are for dry soil unless otherwise noted.)

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

E—1 to 7 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine and fine irregular pores; 15 percent gravel; 5 percent cobbles; 5 percent stones; moderately acid (pH 5.6); clear smooth boundary.

E/Bt—7 to 18 inches; E part (85 percent) is very pale brown (10YR 7/4) gravelly clay loam; Bt part (15 percent) is yellowish brown (10YR 5/4) gravelly clay loam, yellowish brown (10YR 5/6) moist for both parts; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine irregular pores; 25 percent gravel; 5 percent cobbles; 5 percent stones; moderately acid (pH 5.6); clear smooth boundary.

Bt—18 to 28 inches; yellowish brown (10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure parting to weak medium granular; hard, firm, moderately sticky and moderately plastic; common very fine and fine roots; common very fine irregular pores; many

distinct clay films on faces of peds; 30 percent gravel; 10 percent cobbles; 5 percent stones; moderately acid (pH 5.6); clear smooth boundary.
BC—28 to 62 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, moderately sticky and moderately plastic; few very fine and fine roots; few very fine irregular pores; 35 percent gravel; 15 percent cobbles; 5 percent stones; moderately acid (pH 5.6).

Yellowmule Series Family

Taxonomic Class: Fine, mixed, superactive Eutric Haplocryalfs

Typical Pedon

Yellowmule loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed needles, twigs, and leaves.
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 (pH 6.2); 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 (pH 6.0); 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 (pH 6.0); gradual wavy boundary.
Bt2—20 to 60 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 (pH 6.8); gradual wavy boundary.

Zelda Series

Taxonomic Class: Fine-loamy, mixed, superactive Typic Cryaqualfs

Typical Pedon

Zelda loam, in an area of Zelda-Nana-Foolhen complex, 0 to 2 percent slopes, in rangeland, Deer Lodge County, Montana, 350 feet east and 500 feet north of the SW corner of sec. 33, T. 1 N., R. 14 W.

A—0 to 4 inches; dark gray (10YR 4/1) loam, grayish brown (10YR 5/2) dry; moderate coarse platy structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and common medium roots; many very fine tubular pores; very strongly alkaline; clear smooth boundary.
E—4 to 9 inches; grayish brown (10YR 5/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; slightly hard, friable,

slightly sticky and slightly plastic; common fine and few medium roots; many very fine and common fine tubular pores; violently effervescent; very strongly alkaline; abrupt smooth boundary.

Btn1—9 to 14 inches; very dark grayish brown (10YR 3/2) sandy clay loam, grayish brown (10YR 5/2) dry; strong medium columnar structure; hard, firm, moderately sticky and moderately plastic; common very fine and few medium roots; common very fine tubular pores; many distinct clay films on faces of peds; common grayish brown (10YR 5/2) and light gray (10YR 7/2) moist tongues of albic materials on upper vertical faces of peds; very strongly alkaline; clear smooth boundary.

Btn2—14 to 21 inches; dark grayish brown (10YR 4/2) cobbly sandy clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and moderately plastic; common very fine and fine roots; common very fine tubular pores; common distinct clay films on faces of peds; 10 percent gravel; 15 percent cobbles; very strongly alkaline; clear smooth boundary.

Cn1—21 to 34 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, grayish brown (10YR 5/2) dry; massive; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common fine and medium tubular pores; 10 percent gravel; 5 percent cobbles; very strongly alkaline; gradual smooth boundary.

Cn2—34 to 44 inches; brown (10YR 5/3) sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; very strongly alkaline; gradual smooth boundary.

2Cn3—44 to 60 inches; brown (10YR 5/3) very cobbly loamy sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky and nonplastic; 30 percent gravel; 20 percent cobbles; very strongly alkaline.

Formation of the Soils

Factors of Soil Formation

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

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

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

Parent Material

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

Soils, such as the Libeg and Philipsburg series, that formed in quartzite are generally loamy. Soils, such as the Donald and Hairpin series, that formed in lacustrine deposits or alluvium are clayey. Soils, such as the Shewag and Wisdom series, that formed in alluvium are loamy over gravelly sand.

Climate

Temperature and precipitation, along with slope aspect and degree, mainly determine climate, an active force in the formation of soils. In the Big Hole Area—Part of Beaverhead County, winters are cold; springs are cool and moist; and summers are warm 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 survey area, the mean annual precipitation ranges from 14 to 24 inches. The mean annual temperature ranges from 34 to 40 degrees F.

Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography

influences soil development through its effect on drainage and runoff. On the terrace edges of this survey area, runoff water has carved drainages. These rugged areas contrast sharply with the smoother areas of the terrace surfaces.

The number and distinctness of soil horizons generally decrease as slope increases. Soils on steep slopes with rapid runoff have many characteristics similar to those of soils formed in arid climates. Examples of this general principle are the Sebud soil that is moderately steep or steep and the Philipsburg soil that is nearly level to moderately sloping.

Living Organisms

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

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

Vegetation in this survey area consists mainly of short grasses, mid grasses, and shrubs in the valleys and coniferous forests bordering the Beaverhead Deerlodge National Forest.

Time

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

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

Young soils show very little profile development. Eachuston, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a stream. The soil has accumulated enough organic matter to form a thin O horizon but has little clay accumulation and lacks the distinctness of soil horizons within the profile.

The Philipsburg soil formed in parent material that is similar to the parent material of the Eachuston but is older. These soils also formed in alluvium on older, more stable, alluvial fans and stream terraces. They have accumulated enough organic matter to have a thick, dark-colored A horizon; they have distinct clay accumulation in a B horizon; and nearly all of the carbonates have been leached below a depth of 20 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.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief

generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with 0.01 to 0.10 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.

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.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.
Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.
Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.
Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.
Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

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.

Impacted, moderately. Moderately impacted soils generally have good ground coverage, but species present are mainly restricted to those tolerant of the effects of surface mining and smelting activities.

Impacted, severely. Severely impacted soils have substantial barren areas, and the species present are only those that can tolerate the extreme effects of surface mining and smelting activities.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

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.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. (See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

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. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Similarity index. A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height

attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover 0.01 to 0.10 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.
Tread. The relatively flat terrace surface that was cut or built by stream or wave action.
Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.
Understory. Any plants in a forest community that grow to a height of less than 5 feet.
Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
Valley. An elongated depressional area primarily developed by stream action.
Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.
Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.
Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.
Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.
Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.
Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.
Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.
Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.
Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.
Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.
Windthrow. The action of uprooting and tipping over trees by the wind.

Tables

Freeze Dates in Spring and Fall

(Recorded in the period 1971 through 2000 at Wisdom)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	June 29	July 27	August 2
2 years in 10 later than----	June 22	July 18	July 28
5 years in 10 later than----	June 8	July 1	July 19
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	August 16	August 5	July 29
2 years in 10 earlier than--	August 21	August 10	July 31
5 years in 10 earlier than--	August 30	August 18	August 5

Growing Season

(Recorded in the period 1971 through 2000 at Wisdom)

Probability	Daily minimum temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	Days	*Days*	*Days*
9 years in 10	53	17	0
8 years in 10	63	27	5
5 years in 10	83	48	16
2 years in 10	102	68	27
1 year in 10	112	79	33

Temperature and Precipitation

(Recorded in the period 1971 through 2000 at Wisdom)

Month	Temperature (degrees F)					Precipitation (inches)					
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have— Maximum temperature more than	2 years in 10 will have— Minimum temperature less than	Average number of growing-degree days*	Average	2 years in 10 will have— less than	2 years in 10 will have— more than	Average number of days with 0.10 or more	Average Total Snowfall
January-----	27.1	1.6	14.4	48	-40	0	0.62	0.28	0.97	1	7.0
February----	32.0	3.7	17.8	50	-38	0	0.51	0.19	0.84	1	5.5
March-------	40.1	12.8	26.4	57	-21	2	0.67	0.43	0.89	2	4.3
April-------	49.8	21.0	35.4	72	-1	38	0.98	0.49	1.45	3	2.5
May---------	59.7	28.6	44.2	79	12	164	1.70	0.85	2.46	5	1.0
June--------	69.0	35.7	52.4	86	22	371	1.77	0.95	2.58	5	0.0
July--------	77.9	37.4	57.6	90	26	546	1.28	0.48	2.11	3	0.0
August------	77.5	34.6	56.0	90	21	497	1.12	0.53	1.69	3	0.0
September---	67.5	27.1	47.3	85	9	238	0.99	0.23	1.76	3	0.2
October-----	55.2	20.1	37.7	76	-4	57	0.74	0.25	1.17	2	0.8
November----	36.9	12.0	24.5	60	-23	4	0.79	0.40	1.11	3	7.0
December----	27.5	2.7	15.1	47	-37	0	0.72	0.34	1.05	2	6.0
Yearly:											
Average----	51.7	19.8	35.7	———	———	———	———	———	———	———	———
Extreme----	94.0	-55.0	———	91	-47	———	———	———	———	———	———
Total------	———	———	———	———	———	1,917	11.89	9.43	14.33	33	34.1
Average # of days per year with at least 1 inch of snow on the ground: 37											

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

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