United States Department of Agriculture

Forest Service

and

Natural Resources Conservation Service

In cooperation with the University of Idaho, College of Agriculture

Soil Survey of Nez Perce National Forest Area, Idaho

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

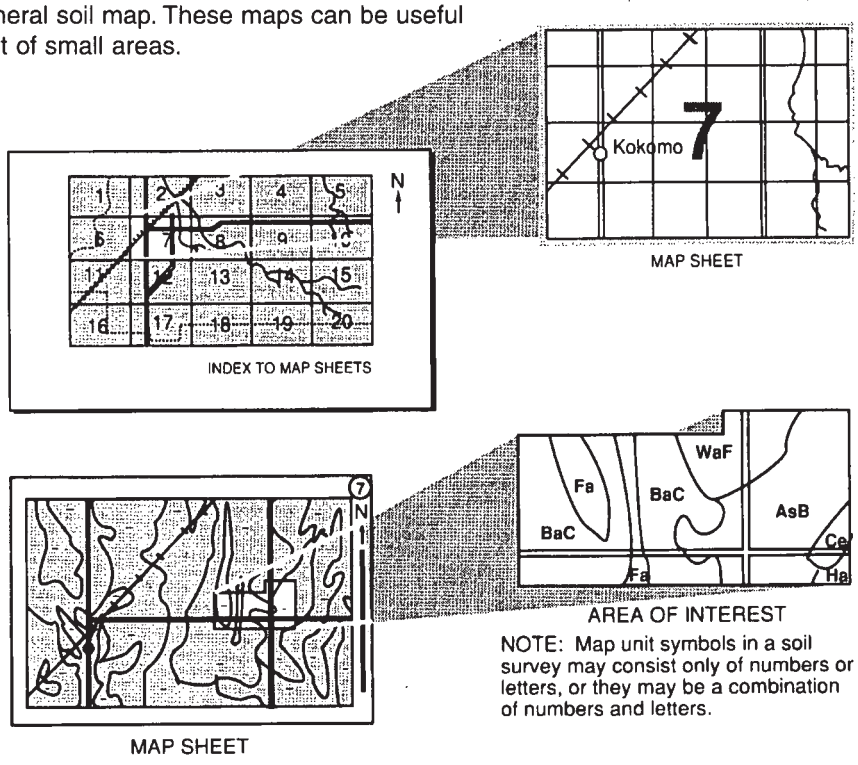
Detailed Soil Maps

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

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

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 field work and technical quality control for this survey were conducted by the Forest Service. The correlation of the soils was conducted by the Natural Resources Conservation Service in consultation with the Forest Service. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Field work for this soil survey was performed from 1981 through 1986. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This survey was made cooperatively by the United States Department of Agriculture, Forest Service and Natural Resources Conservation Service, in cooperation with the University of Idaho, College of Agriculture. It is part of the technical assistance furnished to the Nez Perce National Forest.

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

Cover: Middle ground is map unit 22AHX Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum, warm. Soils are Andic Cryochrepts, sandy, mixed. Background is a mosaic of glaciated and broad convex ridges. Most ridges are Andic Cryochrepts or Dystric Cryochrepts, sandy-skeletal, mixed.

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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Preface

This soil survey contains information that can be used in land-planning programs in the Nez Perce National Forest Area. The landforms, natural vegetation, and bedrock were studied to a greater extent than usually studied in soil surveys in order to define and interpret map units. Surveys such as this one have been referred to in Forest Service publications as "land system inventories" or "integrated inventories." The map units have been called "landtypes."

This soil survey contains information not usually found in soil surveys. Examples are limitations of lower soil layers for road construction and maintenance and landform properties affecting the hazards of sediment for roads. The soil survey is designed primarily for use by Forest Service personnel who manage the Nez Perce National Forest. Others who are interested in the management of the Nez Perce National Forest can use this information to more effectively participate in decisions affecting the environment of the Forest.

The survey area includes some privately owned urban and agricultural lands. This survey was not designed to provide information that can be used in planning uses of these lands. Additional information can be obtained from the local office of the Natural Resources Conservation Service.

Soil Survey of the Nez Perce National Forest Area, Idaho

By Pat Green
Fieldwork by Pat Green and Gary Kellogg

United States Department of Agriculture,
Forest Service and Natural Resources conservation Service,
in cooperation with
the University of Idaho, College of Agriculture

The NEZ PERCE NATIONAL FOREST AREA is located in north-central Idaho in Idaho County (fig. 1). The survey area encompasses about 1,286,459 acres, primarily in the Selway, South Fork of the Clearwater, and Salmon River drainageways. The Nez Perce National Forest Area is bounded on the north by the Clearwater National Forest; on the south by the Payette National Forest; on the west by the Wallowa-Whitman National Forest in Oregon; and on the east by the Bitterroot National Forest in Montana.

In the survey area, topography in the central part consists of gently rolling to moderately steep hills. Steep mountain slopes and very steep dissected stream breaklands occur along major rivers. These mountain slopes and breaklands dominate the topography of the northern part and near the western and southern boundaries. In the eastern part, mountain slopes and ridges occur at elevations of more than 5,000 feet. Alpine glaciation has influenced landform development on ridges with elevations above 6,000 feet. The elevations in the survey area range from about 1,400 feet at the bottoms of canyons near the northwestern boundary to about 8,400 feet at Heavens Gate on the southwestern boundary.

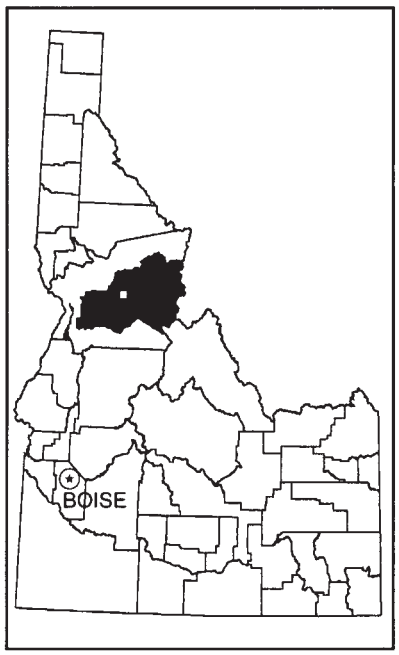

Figure 1.—Location of Nez Perce National Forest Area, Idaho

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, natural resources, climate, geology, vegetation, and physiography.

History and Development

Traces of human occupation of the survey area date from 7,000 years ago. Between 7,000 and 3,000 years ago, ancestors of the Nez Perce tribe traveled through and lived in the area, collected wild plants, fished, and hunted. Substantial winter village sites were occupied along the larger rivers. The Nez Perce practiced their annual cycle of fishing, root gathering, and hunting until the late 1850s with

relatively little interference from trappers, settlers, and missionaries. Their way of life changed when gold was discovered in the region in the early 1860s. Scores of prospectors came to areas, such as Elk City and Florence, to seek gold. The Treaty of 1863 greatly reduced the Nez Perce territory. In 1877, the Nez Perce War began; at its conclusion, the present Nez Perce Reservation was established.

Large-scale gold mining occurred from the late 1800s to about 1950. Many inactive mines and mining claims remain.

The Nez Perce National Forest was created by President Theodore Roosevelt in 1908. National Forests are managed for livestock grazing, mineral reserves, recreation, timber production, watershed, and wildlife and fish habitat. Much of the Nez Perce National Forest is open for mineral exploration and development.

Natural Resources

An average of 102-million board feet of timber are cut annually from Douglas-fir, ponderosa pine, western larch, grand fir, Engelmann spruce, and lodgepole pine within the survey area. Three large mills with a combined capacity of 135-million board feet per year manufacture lumber from timber produced in the survey area. Dimensional lumber is the major product; small quantities of posts and poles are also manufactured.

The survey area provides habitat for over 350 wildlife species, including elk, moose, white-tailed deer, mule deer, bighorn sheep, mountain goat, mountain lion, and black bear, as well as a variety of small mammals and birds. Fishery resources include an anadromous fishery of steelhead trout and chinook salmon in larger drainageways. The Salmon and Clearwater Rivers are world renowned for their anadromous fisheries. Resident cold-water game species include cutthroat trout, rainbow trout, brook trout, Dolly Varden, and mountain whitefish. Warm-water game species include smallmouth bass, channel catfish, and white sturgeon.

The watersheds are part of the Columbia River system. The water is valuable for recreation, fisheries, transportation, irrigation, and power generation. Water quantity is adequate for current uses, and the quality historically has been excellent.

In the survey area, recreational opportunities include hunting, fishing, camping, hiking, cross-country skiing, rock climbing, and river rafting. Major rivers and streams have particular value for fishing and for camping along their banks. Large areas are roadless, providing opportunities for remote activities.

Cattle are grazed on grassland on south-facing slopes in the southern part of the survey area. Cattle are also grazed on scattered meadows at higher elevations or on transitory range created by timber harvest or fire.

Climate

The climate of the survey area is moderated by Pacific maritime air masses that originate 400 miles to the west. Winters are cool and wet; summers are dry. Most of the annual precipitation falls during the winter and spring months. This pattern is illustrated in Table 1, which contains the monthly precipitation for Elk City, Idaho (U.S. Department of Agriculture, 1986). Elk City is located on State Highway 14 about 55 miles east of Grangeville and is at 4,000-feet elevation.

Precipitation during late spring and summer is largely from convective storms that can be of high intensity, though usually of short duration. Average annual precipitation ranges from less than 18 inches in the Salmon River area to more than 60 inches in the high mountain ranges.

Climatic conditions in mountainous areas are extremely variable over short distances because of topographic effects on wind patterns and the effects of slope, elevation, and aspect.

The frost-free season can vary from about 160 days in canyon bottoms at elevations below 2,000 feet to about 70 days on ridges at elevations near 7,000 feet. At any time of the year, nighttime temperatures below freezing can occur in depressions at elevations above 4,000 feet. These frost pockets are common, caused by nighttime accumulations of cold air in low-lying areas where cold air drainage is restricted by topography.

Geology

In the survey area, bedrock that provides soil parent materials upon weathering was emplaced over long periods. The Belt Supergroup rocks of Precambrian Age (more than 600-million years old) were laid down in a seabed and subsequently metamorphosed. These rocks are mostly schist, gneiss, and quartzite. The Seven Devils Volcanics were extruded in the southwestern part of the survey area and are of Permian and Triassic Age (208- to 286-million years old). These volcanics are metamorphosed andesite flows associated with shale and limestone. The Idaho Batholith granitics were intruded during late Cretaceous time (66- to 110-million years ago). Most of these rocks are

quartz monzonite, granodiorite, and granite. Some smaller granitic areas were apparently implanted within the Idaho Batholith during early Tertiary time (60-million years ago). A variety of metamorphic rocks are associated with the Idaho Batholith. Many of these rocks are gneiss or schist that seem to be located near the margins of the granitics and probably represent the metamorphism associated with the intrusions. Miocene basalt flows (13- to 25-million years old) overlie portions of the western part of the survey area.

Mineralogy, past weathering environments, faulting, and hydrothermal effects have influenced bedrock character. Basalt, rhyolitic rocks, and limestone have weathered slowly. Hard, angular rock fragments are common in the lower soil layers when soils are formed in material derived from these rocks. Granitic rocks have been chemically weathered at low elevations on relatively low-relief landscapes. Lower-elevation soils formed in material derived from weathered granitic rocks are deep and have relatively few rock fragments. At higher elevations, this bedrock is weakly weathered. The soils generally have many hard, angular rock fragments in the lower soil layers, and bedrock can be within 5 feet of the surface.

Parent Material Groups

Physical and chemical properties of soils and the underlying material are often directly related to the kind of bedrock or geologic origin of the material. During the mapping of this survey, relationships between soil properties and geologic origin of the parent material were observed and were used to help map the distribution of soils. Relationships between geologic origin of parent material and performance of lower soil layers on road cutbanks, in roadfills, and as native road surfaces were observed and used to identify limitations for these uses.

Most soils in the survey area have surface layers formed in loess that has been influenced by volcanic ash. A layer of this loess was deposited on the survey area approximately 6,700 years ago by the eruption of Mount Mazama in Oregon. Additional loess that has been influenced by volcanic ash was deposited by eruptions of Mount St. Helens and Glacier Peak. These loess deposits range from 30-inches thick in depressions to very thin deposits that may be mixed with underlying materials on steep southerly aspects at lower elevations. Soil surface layers formed in loess are an excellent medium for plant growth. Soils with the thickest loess surface layers tend to be the most productive.

Although most soil surface layers are formed in loess that has been influenced by volcanic ash or loess mixed with subsoil material, lower soil layers are formed in materials derived from other sources. The following parent material groups were used in mapping and interpreting lower soil layer properties in this survey.

Alluvium is unconsolidated material sorted and deposited by water. Rock fragments are generally rounded. Alluvium forms flood plains and terraces along major streams. These features are narrow and linear. Soil drainage and texture are variable; consequently, soils in map units containing these deposits are classified at high categorical levels.

Glacial till is unconsolidated deposits of clay, sand, gravel, and boulders. Most glacial till in the survey area is of local origin, and characteristics of the local bedrock determine its properties. Tills derived from granitic rocks have sandy textures. Tills derived from basalt, andesite, and Tertiary sediments have loamy textures. Glacial till occurs on moraines, in glacial trough bottoms, and on the lower slopes of glacial trough walls and cirque headwalls.

Tertiary sediments and well-weathered metasediments are upland alluvial deposits or deeply weathered schist that have been influenced by alluvial deposits. These sediments occur on mountain slopes and rolling uplands and are generally sandy clay loam and clay loam and may have rounded rock fragments. Soil subsoils are generally very thick and tend to perch water.

Granitic rocks are granite, gneiss, schist, and associated quartzite. Granitic rocks weather to sandy loam or loamy sand or to sand. The content and hardness of rock fragments vary with the degree of chemical weathering of the rock. Chemical weathering is most intense at low elevations and in zones of high precipitation. Lower soil layers are erodible. These parent materials are the most common in the survey area and occur on all landforms.

Weathered granitics (grus) are granitic rocks that have rock structure, are soft, and can be dug with a spade. Soil derived from these rocks contains large amounts of fine gravel-sized particles of weakly consolidated rock. Many of these particles can be crushed with the fingers. The lower soil layers are formed in weathered granitic rock in places and are relatively impermeable to roots and water. The layers rapidly break into a mixture of pea-sized gravel and sand when exposed by excavation. These parent materials generally occur on rolling uplands. Soils with erodible subsoils and very erodible lower soil layers are associated with these materials. Lower soil layers formed in weathered granitic rocks are very difficult to revegetate when exposed.

Basalt is a hard, commonly well-fractured bedrock. Soil derived from basalt is loamy and contains many hard angular or subangular rock fragments. Soil with subsoil clay accumulations is associated with basalt.

Rhyolitic rocks are mostly hard, well-fractured andesite. The Seven Devils Volcanics formation consists of rhyolitic rocks. Limestone and slate are included in places. Soil derived from rhyolitic rocks is loamy and contains many hard angular rock fragments. Soil with subsoil clay accumulations is associated with rhyolitic rocks.

Vegetation

The survey area is predominantly forested or is potential forest. The principal tree species include ponderosa pine, western white pine, western red cedar, western larch, Douglas-fir, grand fir, subalpine fir, Engelmann spruce, and lodgepole pine. The existing vegetation reflects the occurrence of periodic wildfires. Most forest stands can be dated to a stand replacing wildfire. Extensive areas were burned in 1910 and 1919, and large areas in the Selway River drainageway burned again in 1934. Extensive brush fields on the northern side of the Selway River resulted from repeated wildfires.

Less than 5 percent of the survey area is grassland. Grassland is on steep, south-facing slopes of the Salmon River Canyon. Small openings dominated by alder, menziesia, and brackenfern occur on the lower slopes, which are seasonally saturated with well-aerated water from the upper slopes. Sedge meadows occur in depressions where the water table is near the surface year round. At high elevations, grasses and forbs dominate forest openings on windswept, well-drained ridges.

Habitat Types

Habitat types are considered basic ecological subdivision of landscapes. Each habitat type is recognized by distinctive combinations of overstory and understory plant species at climax. Habitat types are named for the dominant or characteristic vegetation of the climax community (Cooper, 1987.) Habitat types are useful for assessing the combined effects of aspect, slope, elevation, and soil properties on potential plant growth. Habitat types were an important factor in estimating productivity and limitations to forest regeneration in this survey area.

Habitat Type Groups

Habitat types often have similar implications for the kind of interpretative uses made of them in soil surveys. Habitat types with similar implications for soil survey objectives are grouped in this report. The groups are named and described in the following paragraphs. Group names are used throughout this report.

Open dry coniferous forest. This group contains habitat types on which forest stands are mostly ponderosa pine. Major habitat types occur within the ponderosa pine series: ponderosa pine/snowberry, ponderosa pine/mallow ninebark, and ponderosa pine/bluebunch wheatgrass. Included in mapping are small areas of habitat types in closely related groups. Habitat types within the Douglas-fir series occur on some northerly aspects and along draws. This habitat type group occurs mainly on southerly aspects at low to mid elevations. Elevations are below 6,500 feet on slopes with dominant gradients greater than 35 percent.

Dry mixed coniferous forest. This group contains habitat types on which forest stands are mostly mixed Douglas-fir and ponderosa pine. Major habitat types are Douglas-fir/mallow ninebark and grand fir/mallow ninebark. Douglas-fir/snowberry and grand fir/blue huckleberry are in some delineations and have similar management implications. This habitat type group is mainly at mid elevations in the southern and western parts of the survey area, on northerly aspects with elevations below 4,000 feet, and on southerly aspects with elevations above 4,000 feet.

Mixed coniferous forest. This group contains habitat types on which forest stands are mainly mixed Douglas-fir, ponderosa pine, grand fir, and western larch. Major habitat types are grand fir/beargrass and grand fir/queencup beadlily. Grand fir/twinflower, grand fir/wild ginger, and grand fir/blue huckleberry occur in some delineations and have similar management implications. This group contains only that portion of these habitat types on which ponderosa pine is a common seral species and lodgepole pine and Engelmann spruce are uncommon. Where Engelmann spruce and lodgepole pine are common seral species, these habitat types are within the cold coniferous forest group. This habitat type group occurs at mid elevations in the central part of the survey area. Elevations range from below 4,000 feet on northerly aspects to above 4,000 feet on southerly aspects.

Moist mixed coniferous forest. This group contains habitat types on which western red cedar is a major component of forest stands. Grand fir, Douglas-fir, and western larch are also major stand components. Major habitat types are western red cedar/queencup beadlily and western red cedar/wild ginger. Included in mapping are areas of habitat types in closely related groups; grand fir/queencup beadlily and grand

fir/wild ginger are the most common. This habitat type group occurs at low to mid elevations in the Selway River drainageway. Elevation ranges from 1,400 feet on northerly aspects to 5,500 feet on southerly aspects.

Cold mixed coniferous forest. This group contains habitat types on which Douglas-fir, grand fir, western larch, Engelmann spruce, lodgepole pine, and subalpine fir are major stand components. In most of the survey area, the higher-elevation portions of grand fir/beargrass and grand fir/queencup beadlily are the major habitat types. In the southwestern part of the survey area, the higher-elevation portions of grand fir/twinflower and grand fir/blue huckleberry are major habitat types. Subalpine fir/queencup beadlily and subalpine fir/blue huckleberry occur in some delineations and have similar management implications. Included in mapping are small areas of habitat types in closely related groups; subalpine fir/beargrass and subalpine fir/menziesia are at higher elevations and along draws. This habitat type group is at mid to high elevations throughout the survey area. Elevations range from 4,500 to 5,500 feet on northerly aspects and from 5,000 to 6,000 feet on southerly aspects.

Subalpine forest. This group contains habitat types on which forest stands are mixed lodgepole pine, Engelmann spruce, and subalpine fir. Major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia on northerly aspects. Included in mapping are small areas of habitat types in closely related groups; subalpine fir/queencup beadlily and subalpine fir/blue huckleberry are common at lower elevations. This habitat type group occurs at elevations of 5,500 to 7,500 feet throughout the survey area.

Open subalpine forest. This group contains habitat types on which forest stands are mixed whitebark pine, lodgepole pine, and subalpine fir. Stands are open grown or tend to form clusters. Major habitat types are whitebark pine/subalpine fir and the higher-elevation portions of subalpine fir/beargrass. Subalpine fir/woodrush occurs in some delineations and has similar management implications. Included in mapping are small areas of habitat types in closely related groups. Habitat types within cold mixed coniferous forest or subalpine forest are often included at lower elevations. This habitat type group occurs at elevations above 6,500 feet.

Wet forest. This group contains habitat types that occur on valley bottoms or in moist draws that receive additional moisture from seepage, fluctuating water tables, or flooding. Forest stands are mixed subalpine fir, lodgepole pine, and Engelmann spruce. Grand fir and western red cedar are included in places. Major habitat types are subalpine fir/bluejoint and subalpine fir/claspleaf twisted stalk. Grand fir/arrowleaf groundsel occurs at elevations below 5,000 feet. Western red cedar/maidenhair fern and western red cedar/ladyfern occur in the Selway River drainageway.

Community Type Groups

There is no habitat type classification system for forest openings within the survey area. The following groups of vegetative community types are used to describe vegetation in forest openings.

Grassland occupies southerly aspects at low to mid elevations. Grassland dominates the landscape at elevations ranging from 1,400 to 6,000 feet on steep, south-facing slopes of the Salmon River canyon. Plant communities are comparable to the bluebunch wheatgrass/Sandberg bluegrass and Idaho fescue/bluebunch wheatgrass habitat types (Tisdale, 1979.)

Moist forest openings are on lower slopes along draws at mid to high elevations in the northern half of the survey area. These openings are mostly at elevations of 4,500 to 6,500 feet. Seepage water from upper slopes causes seasonal shallow water tables. A variety of community types occur in moist forest openings, frequently in complex patterns. Communities dominated by Sitka alder, brackenfern, and western coneflower are common. Mountain maple, mountain red elderberry, arrowleaf groundsel, menziesia, willow, wild ginger, thimbleberry, and baneberry are common. Timber-stand establishment in adjacent forest stands is limited by animal damage and vegetative competition.

Grassy balds occupy high-elevation ridges that are exposed to strong winds. These sites are drier than surrounding sites because of redistribution of snow by the wind. Beargrass, Idaho fescue, elk sedge, Parry's rush, yellow eriogonum, poke knotweed, powder phlox, lupine, aster, and coiled lousewort dominate these communities.

Sedge meadows occur mostly at elevations above 4,500 feet in stream bottoms where high water tables restrict tree growth. Plants include sedges, rushes, Jeffrey shootingstar, Canby's licorice-root, twinflower marsh marigold, Modoc bog orchid, and mosses.

Physiography

The survey area is located mostly in the Clearwater Mountains but includes parts of the Seven Devils Mountains (fig. 2). The Clearwater Mountains are intrusive mountains formed on the Idaho

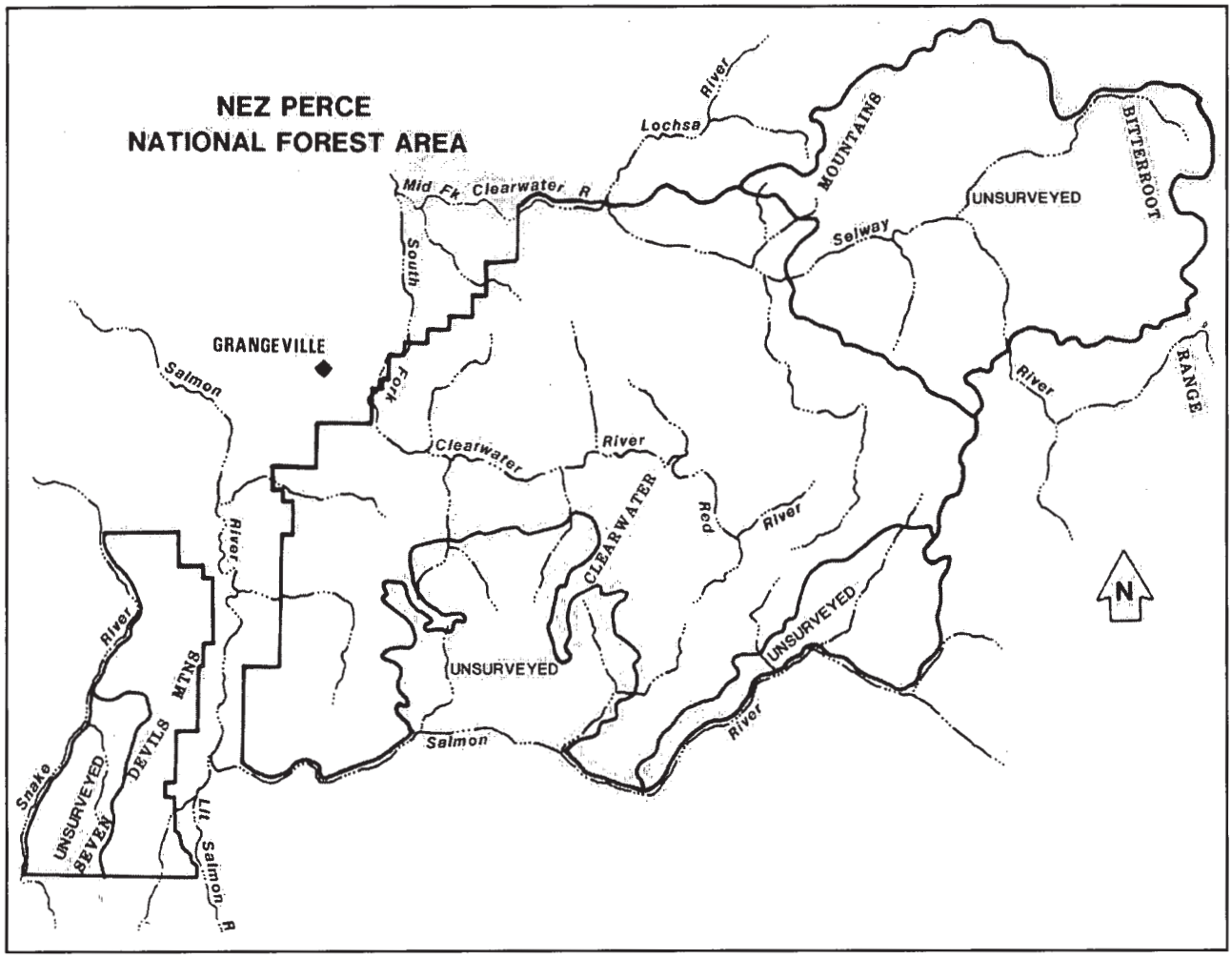

Figure 2.—Physiographic features of the Nez Perce National Forest Area

Batholith. The Seven Devils Mountains are intensely folded and faulted andesite flows, shale, and limestone. Major streams have carved deep canyons as the result of mountain uplift. In the western part of the survey area, basalt flows formed plateaus. The mountains with the highest elevations were glaciated by alpine glaciers. Alpine glaciation produced a distinctive landscape dominated by glacial cirques and U-shaped glacial valleys. The survey area is in the drainageways of the Clearwater and Salmon Rivers. Principal watercourses are the South and Middle Forks of the Clearwater River and the Selway and Salmon Rivers.

Landforms

Each detailed map unit is on a characteristic landform. General soil map units consist of combinations of landforms. Landform properties visible on aerial photographs were often used to plot delineation boundaries. The landform properties of map units can help map users identify map unit delineations.

The following classes of landforms were used to define map units and assist in mapping. The landform names are used throughout this survey. Figures 3 through 12 illustrate many of the landform classes.

Stream bottoms (map unit symbols beginning with 10) are nearly level, slightly concave areas near streams (fig. 3). This landform contains stream flood plains, low terraces, and alluvial fans. These landforms are long and narrow. Stream densities are about 10 miles per square mile. More than 50 percent are third- or higher-order streams, and vertical relief from major streams to adjacent landform high points is less than 50 feet. Lower soil layers are porous and gravelly. Soils have fluctuating water tables.

Because delineations are narrow, management activities tend to be near streams, increasing the risk of adding sediment to stream systems. These landforms are suitable for a variety of activities, such as road construction, mining, and recreation. Most of this landform is a riparian area. Conservation practices that protect riparian values may be required when managing this landform and adjacent uplands.

Stream terraces and alluvial fans (map unit symbols beginning with 13) are nearly level to gently sloping deposits of alluvial material along rivers. Stream terraces are flat to slightly concave step-like benches with short, steep descending slopes facing the stream. Vertical relief from the bottom of the terrace riser to the bench surface is 50 to 200 feet. Lower soil layers are gravelly and permeable. Alluvial fans are cone-shaped deposits at the mouths of steeply graded streams. Materials may be stratified and contain many rock fragments. Low-order drainageways cross these landforms. Stream densities are about 2 miles per square mile, and 90 percent are first- and second-order streams. Stream terraces and alluvial fans can deliver sediment to streams efficiently because of proximity to higher-order streams.

Low-relief rolling uplands (map unit symbols beginning with 22A) are rounded low hills 100- to 300-feet high (fig. 4). Slopes are straight to convex with gradients of 10 to 40 percent. Drainageways are gently concave. The drainageway pattern is dendritic. Low-relief rolling uplands underlain by weathered granitic rocks have a dense pattern of drainageways with short reaches. Drainage densities are about 7 miles per square mile, and drainageways are about 100 to 600 feet apart. Low-relief rolling uplands underlain by other rocks have drainageways with longer reaches that are further apart. Drainage densities are about 3 miles per square mile, and drainageways are about 300 to 1,000 feet apart.

Roads constructed on low-relief rolling uplands cross drainageway channels frequently. Many forest

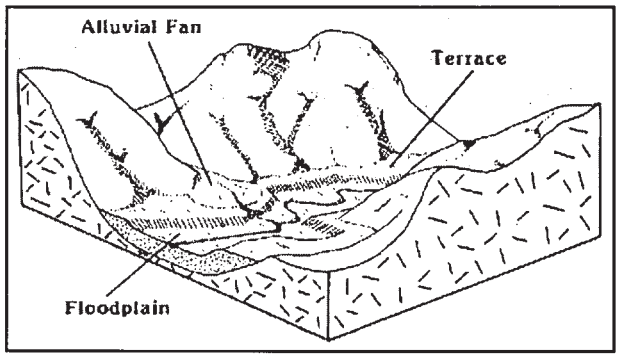

Figure 3.—Stream bottoms contain flood plains, terraces, and alluvial fans. Large terraces and alluvial fans are mapped as separate landforms.

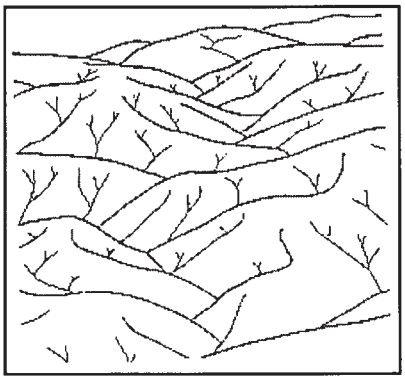

Figure 4.—Rolling uplands are hilly landscapes underlain by granitic rocks.

roads built on this landform have a high potential to contribute sediment to the channels.

High-relief rolling uplands (map unit symbols beginning with 24A and 24C) are rounded hills 250- to 500-feet high. Slopes are convex with gradients of 25 to 50 percent. Drainageways are concave. The drainageway pattern is dendritic. Drainage densities are about 3 miles per square mile, and first-order stream drainageways are about 300 to 800 feet apart. More than 85 percent are first- and second-order streams.

High-relief rolling uplands deliver sediment to streams efficiently because of moderate slope gradients and moderate distances between drainageway channels. Slope gradients and aspects are complex, and combinations of tractor and cable yarding are needed to harvest timber.

Plateaus (map unit symbols beginning with 27) are broad, undulating to hilly, mountain summits (fig. 5). Slopes are straight to slightly convex with gradients of 10 to 25 percent. Drainageways are broadly concave and very widely spaced. Drainage densities are less than 1 mile per square mile, and stream drainageways are about 1,000 to 5,000 feet apart. All are first-order drainageways.

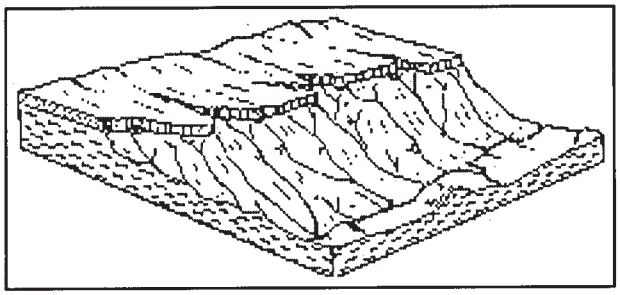

Figure 5.—Plateaus are undulating to hilly mountain summits formed on horizontal bedrock layers.

Plateaus deliver sediment to streams inefficiently because of gentle slopes and widely spaced channels. These landforms are underlain by basalt bedrock that is resistant to weathering. Soils are 20- to 60-inches deep over bedrock, and lower soil layers contain many rock fragments.

Dissected mountain slopes (map unit symbols beginning with 31) are complexes of narrow ridges about 500- to 1,000-feet high (fig. 6). Slopes are nearly straight with gradients from 25 to 60 percent. The drainageway pattern is parallel, though some branching of lower-order drainageways occurs.

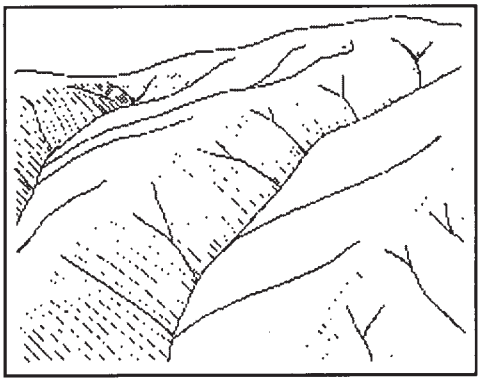

Figure 6.—Dissected mountain slopes have straight slopes, and drainageways are close together.

Drainage densities are about 4 miles per square mile, and first-order drainageways are about 400 to 1,000 feet apart. More than 80 percent are first- and second-order drainageways.

Dissected mountain slopes deliver sediment to streams efficiently because of moderately steep to steep straight slopes and channels that are relatively close together.

Mountain slopes (map unit symbols beginning with 32) are complexes of ridges 300- to 750-feet high (fig. 7). Slopes are convex with gradients of 10 to 45 percent. Drainageways are gently concave. The drainageway pattern is dendritic. Drainage densities are about 3 miles per square mile, and first-order drainageways are about 750 to 1,750 feet apart. More than 95 percent are first- and second-order drainageways.

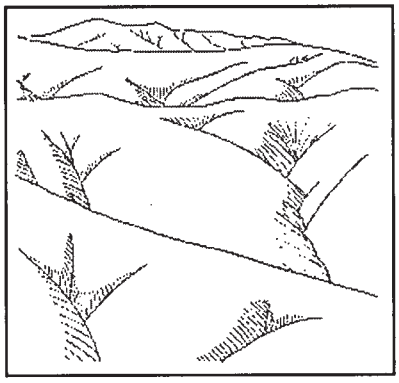

Figure 7.—Mountain slopes have convex upper slopes and ridges, and drainageways are widely spaced.

Mountain slopes deliver sediment to streams inefficiently on gently sloping ridges and with

moderate efficiency on moderately steep side slopes. Many forest roads built on this landform have the potential to contribute sediment to streams.

Mountain ridges (map unit symbols beginning with 33) are broadly rounded ridges. Slopes are convex with gradients of 5 to 45 percent. Drainageways are poorly defined and widely spaced. Drainage densities are about 1 mile per square mile, and first-order drainageways are more than 1,000 feet apart. Nearly all are first-order drainageways.

Mountain ridges deliver sediment to streams inefficiently because of gently sloping, broadly convex slopes and widely spaced streams. These landforms are in cold, high-elevation climates, and most materials contain many angular rock fragments. Many forest roads built on this landform have the potential to contribute sediment to streams.

Nivational hollows (map unit symbols beginning with 36) are depressions on northerly aspects of mountain slopes (fig. 8). These hollows are teardrop-shaped in outline with the narrow end downslope. They form the upper reaches of drainageways. Slopes are concave with gradients of 10 to 45 percent. Drainageways are poorly defined, and densities are about 4 miles per square mile. Most are first-order drainageways. Nivational hollows occur at high elevations; their origins are thought to be related to snow accumulation on the lee side of ridges in periglacial climates. There is a series of more strongly expressed hollows, increasing in elevation until they merge with glacial cirque basins at even higher elevations. Nivational hollows deliver sediment to streams efficiently because of concave slopes, which tend to concentrate runoff, and closely spaced drainageways.

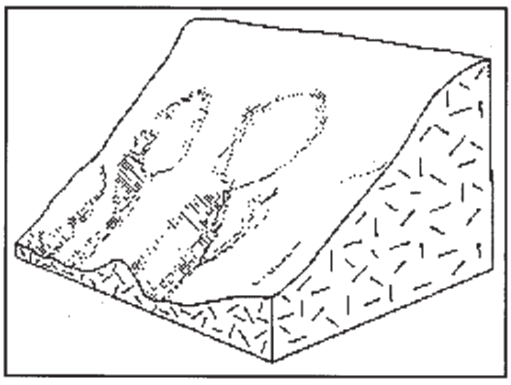

Figure 8.—Nivational hollows are concave depressions at the heads of drainageways on mountain slopes.

Glacial cirques (map unit symbols beginning with 41 or 42) are concave, bowl-shaped basins with headwalls 500- to 2,500-feet high (fig. 9). Glacial cirques have steep to nearly vertical headwalls and flat to gently sloping basin floors. Bedrock may outcrop on headwalls. The basin floors have glacial till deposits, and there are small lakes in places. walls. Stream densities are about 6 miles per square mile, and about 50 percent are third- and fourth-order

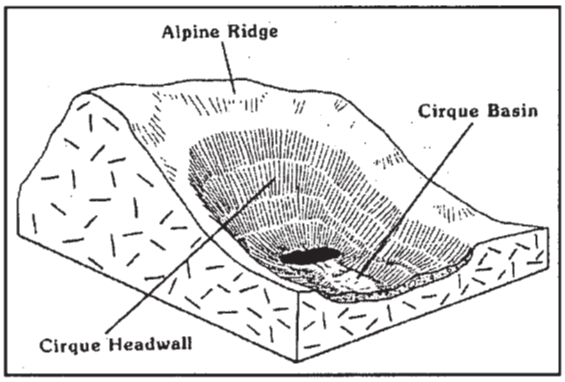

Figure 9.—Glacial cirques have very steep headwalls and basins that often contain small lakes.

Glacial cirque headwalls deliver sediment to the basin floor efficiently because of steep concave slopes. The basin floor tends to trap and delay moving sediment. Regolith water storage capacity is limited by bedrock and moves out of this landform rapidly, particularly during snowmelt.

Moraines (map unit symbols beginning with 46) are rolling to hilly glacial till deposits with a topography characterized by randomly oriented mounds and depressions. The drainageway pattern is weakly developed with first-order drainageways with long reaches. Surface drainageways are poorly developed, and many depressions have no outlet. In the survey area, delineations are typically downslope from glacial cirques or trough walls, and water from these landforms is concentrated in the morainal deposits. Because of the steepness of slope, moraines deliver sediment to streams with low efficiency on gently sloping moraines and with moderate efficiency on moderate and steeply sloping moraines.

Glacial trough bottoms (map unit symbols beginning with 47) are the nearly level to gently sloping bottoms of U-shaped glacial valleys. Slope gradients are generally 0 to 25 percent but may range to 40 percent adjacent to valley walls. Trough bottoms have thick mantles of glacial till, glacial outwash, stream alluvium, and debris from adjacent valley streams. Delineations typically are parallel to a major stream.

Glacial trough bottoms deliver sediment to streams efficiently because most of this landform is close to a stream. Because of their location, these landforms are often desirable areas for a variety of activities, such as road construction and recreation. Much of this landform is a riparian area. Conservation practices may be required to protect riparian values.

Glacial trough walls (map unit symbols beginning with 48) are concave sides of U-shaped glacial valleys (fig. 10). Slopes are vertically concave with gradients ranging from 25 to more than 60 percent. The drainageway pattern is parallel. Drainage densities are about 3 miles per square mile, and first-order streams are about 500 to 1,000 feet apart. More than 85 percent are first- and second-order drainageways.

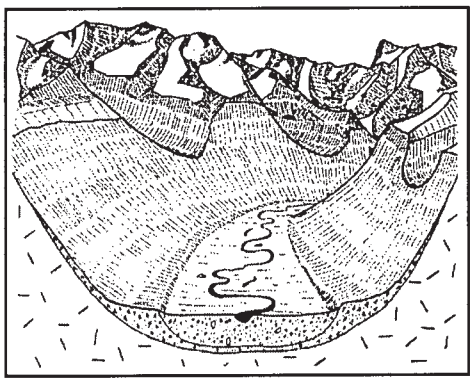

Figure 10.—Glacial trough walls are concave valley side slopes in U-shaped glacial valleys. Trough bottoms contain glacial drift, alluvium, and colluvium.

Glacial trough walls deliver sediment to streams efficiently because of steep slopes and relatively closely spaced drainageways. Lower slopes are mantled by thick glacial drift deposits that thin the upslope. The lower slopes help to slow rapid runoff from upper slopes. Many forest roads built on this landform have the potential to contribute sediment to the streams.

Landslide deposits (map unit symbols beginning with 50) are lobate deposits of material (fig. 11). Slip scarps and toes of small slumps give the surface of this deposit its irregular, hummocky appearance. The drainageway pattern is deranged with stream channels appearing and disappearing because of subsurface disruption of ground-water flow. Drainage densities are about 5 miles per square mile and first-order streams are 200 to 500 feet apart. Landslide deposits deliver sediment to streams efficiently because landslides may be deactivated and deposit sediment directly into closely spaced drainageway channels.

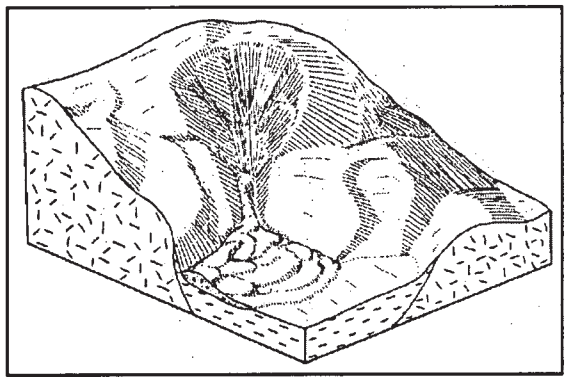

Figure 11.—Landslide deposits have hummocky topography, cracks, and slump escarpments.

Undissected stream breaklands (map unit symbols beginning with 60) are steep and have straight to concave slopes up to 3,000 feet high (fig. 12). Slope gradients are 60 percent or more. The drainageway pattern is parallel. Drainage densities are about 4 miles per square mile, and first-order drainageways are about 700 to 3,000 feet apart. More than 70 percent are first- and second-order drainageways. Undissected stream breaklands deliver sediment to streams efficiently because of steep slopes. Many forest roads built on this landform have the potential to contribute sediment to the streams.

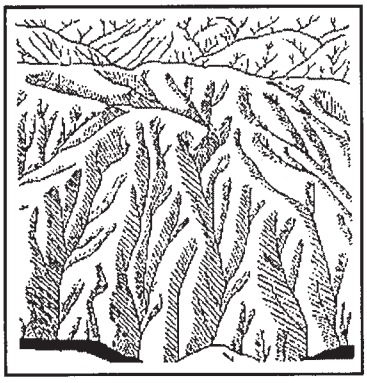

Figure 12.—Stream breaklands are very steep slopes along major streams.

Dissected stream breaklands (map unit symbols beginning with 61) are steep, and have straight to concave slopes up to 3,000 feet high. Slope gradients are 60 percent or more. The drainageway pattern is

parallel, but some branching of low-order streams occurs. Drainage densities are about 5 miles per square mile, and first-order drainageways are about 300 to 700 feet apart. More than 80 percent are first- and second-order drainageways. Dissected stream breaklands deliver sediment to streams very efficiently because of steep slopes and closely spaced drainageways. Many forest roads built on this landform have the potential to contribute sediment to the streams.

Breakland drainageway heads (map unit symbols beginning with 63) are triangular-shaped features with the narrow end downslope at the heads of drainageways on stream breaklands. Slope gradients range from 40 to more than 60 percent. The drainageway pattern is pinnate, with the confluence of drainageways near the lower, narrow end of the landform. Drainage densities are about 4 miles per square mile, and first-order drainageways are about 200 to 600 feet apart. Most are first- and second-order drainageways.

Breakland drainageway heads deliver sediment to streams very efficiently because of steep slopes and closely spaced drainageways. The point where drainageways converge at the lower apex of the landform tends to accumulate sediment. This convergence may be a source of debris avalanches and flash floods. Many forest roads built on this landform have the potential to contribute sediment to the streams.

How This Survey Was Made

The survey area is mountainous and heavily forested. Mapping techniques used in other survey areas were impractical because of the difficult access. The mapping techniques used relied heavily on plotting delineation boundaries, using features visible on aerial photographs. Most commonly these features were landforms or natural vegetation. Geologic maps and elevation were also used to plot delineation boundaries. Observations were made along field transects and traverses through representative delineations of map units. Relationships between properties important to survey objectives and features visible on aerial photographs were observed. Features used to plot delineation boundaries were sometimes revised as a result of field checking. Reliable relationships between photographic features and map unit properties were established. These properties were observed and described in the field. Physical and chemical properties of soils that cannot be measured with field techniques are derived from laboratory characterization of soils within the survey area and similar soils in adjacent areas.

Table 2 lists the most important features used to plot delineation boundaries for each map unit. Properties of landforms, slope, parent material groups, vegetation, aspect, elevation, and rock outcrop are described in the "Glossary," and the *Physiography*, *Geology*, and *Vegetation* portions of this section.

Map unit symbols can be used to group map units with similar landforms. Each landform has a unique two-digit number that provides the first two characters in map unit symbols. Landform properties are important in many of the interpretations made from this survey. Groupings of map units with similar landforms are useful for many kinds of planning.

The map units in this survey are described in the "General Soil Map Units" and "Detailed Soil Map Units" sections.

General Soil Map Units

The general soil map shows broad areas with similar topography and soil patterns. Each map unit is a unique natural landscape. A map unit typically consists of one or more major soils and some minor soils.

The general soil map can be used to compare the suitability of large areas for common land uses. The map is not suitable for planning the use of small areas because of its small scale.

Soils on Rolling Uplands and Plateaus

The landscape is characterized by low-relief hills on mountain ridges or summits. The dominant slope ranges from 10 to 30 percent with slopes up to 50 percent along drainageways in some places. Granitic rocks, basalt, Tertiary sediments, and metasedimentary rocks are major sources of parent material.

Loess surface layers that have been influenced by volcanic ash tend to have a more uniform thickness on these landforms. Average thickness of the loess is slightly greater on northerly aspects than on southerly aspects.

1. Soils underlain by tertiary sediments and metasedimentary rocks

This map unit occurs on rolling uplands in the Elk City basin. Delineations occur mainly in the drainageways of the Newsome, Johns, and Meadow Creeks; along the South Fork of the Clearwater River; and near Pine Knob in the Selway River drainageway. This map unit comprises about 1 percent of the survey area and consists of about 80 percent Eutric Glossoboralfs and 20 percent soils of minor extent.

The Eutric Glossoboralfs have loess surface layers that have been influenced by volcanic ash and are 4- to 14-inches thick. These soils have subsoil clay accumulations that restrict water movement and root penetration. The Eutric Glossoboralfs occur under mixed coniferous forest below 5,200 feet.

Included with this map unit are areas with hard, brittle subsoil layers and areas with mottled subsoils. These areas occur in moist draws.

Timber productivity is moderate to high. The hazard of erosion is moderate if lower soil layers are exposed by logging or by road construction. Road surfaces rut, and road cuts tend to slough. Frequent drainageway crossings increase the cost of roads. Very deep soils store large amounts of water and yield water slowly as streamflow.

2. Soils underlain by granitic rocks

This map unit occurs on rolling uplands. Delineations occur mainly in the South Fork of the Clearwater River and the Selway River drainageways at middle elevations. This map unit comprises about 32 percent of the survey area and consists of about 40 percent Andic Dystrochrepts, 40 percent Andic Cryochrepts, and 20 percent soils of minor extent.

The Andic Dystrochrepts have loess surface layers that have been influenced by volcanic ash and are 7- to 14-inches thick. These soils have sandy loam subsoils and gravelly sandy loam or loamy sand substrata. The Andic Dystrochrepts occur under mixed coniferous forest below 5,000 feet.

The Andic Cryochrepts have surface layers that have been influenced by volcanic ash and are 7- to 14-inches thick. These soils have thin gravelly sandy loam subsoils and very gravelly sandy loam or loamy sand substrata. The Andic Cryochrepts occur under cold mixed coniferous forest and subalpine forest from 5,000 to 6,500 feet.

The Aquepts and Typic Cryandepts are soils of minor extent in moist draws and depressions. The Typic Vitrandepts and Entic Cryandepts are soils of minor extent on lower slopes. The Typic Dystrochrepts and Dystric Cryochrepts are soils of minor extent on steep southerly aspects.

Timber productivity is moderate to high. Complex slopes limit tractor operation in some areas. The hazard of erosion is moderate to severe if lower soil layers are exposed by logging or by road construction. Frequent drainageway crossings increase the cost of roads. Deep soils store large amounts of water and yield water slowly as streamflow.

3. Soils underlain by weathered granitic rocks

This map unit occurs on rolling uplands. Delineations occur mainly in the Florence and Dixie Basins, upper Bargamin and Cougar Creeks, and on Blacktail Butte. This map unit comprises about 4 percent of the survey area and consists of about 67 percent Andic Cryochrepts, 13 percent Andic Dystrochrepts, and 20 percent soils of minor extent.

The Andic Cryochrepts occur under cold mixed coniferous and subalpine forest above 5,000 feet. The Andic Dystrochrepts occur under mixed coniferous forest below 5,000 feet.

Both soils have surface layers that have been influenced by volcanic ash. These surface layers are 7- to 14-inches thick. The Andic Cryochrepts and Andic Dystrochrepts have thin sandy loam subsoils and sandy substrata. Lower soil layers are well-weathered granitic rocks that restrict root and water penetration. When exposed by excavation, these soils rapidly break down to coarse sand and pea-sized gravel.

The Aquepts and Cryumbrepts are soils of minor extent in moist draws. The Dystric Cryochrepts are soils of minor extent on steep southerly aspects.

Timber productivity is moderate. Complex slopes limit tractor operation. The hazard of erosion is very severe if lower soil layers are exposed by logging or by road construction. Frequent drainageway crossings increase the cost of roads.

4. Soils underlain by basalt

This map unit occurs on plateaus and low-relief rolling uplands. Delineations occur in the Salmon River drainageway and near Pine Knob Creek. This map unit comprises about 2 percent of the survey area and consists of about 77 percent Andeptic Cryoboralfs, 13 percent Ultic Argixerolls, and 10 percent soils of minor extent.

The Andeptic Cryoboralfs have loess surface layers that have been influenced by volcanic ash and are 7- to 20-inches thick. These soils have very gravelly clay loam or loam subsoils. The Andeptic Cryoboralfs occur on low-relief rolling uplands under cold mixed coniferous forest above 5,000 feet.

The Ultic Argixerolls have dark-colored surface layers, subsoil clay accumulations, and very gravelly or very cobbly clay loam or loam substrata. These soils occur on plateaus under open dry and dry mixed coniferous forest below 5,000 feet.

The Eutric Glossoboralfs are soils of minor extent that occur under moist mixed coniferous forest below about 5,000 feet. The Aquic Cryoboralfs are soils of minor extent in moist draws.

Timber productivity is moderate on Andeptic Cryoboralfs and low to moderate on Ultic Argixerolls. The hazard of erosion is slight if lower soil layers are exposed by logging or by road construction. Bedrock is well fractured, and water is yielded slowly as streamflow.

Soils on Mountain Slopes and Ridges

The landscape is characterized by mountain slopes and ridges with widely spaced drainageways. Low-order drainageways have relatively long reaches. Stream channels have angular cobble beds and stable banks. Slopes are convex. Drainages tend to be farther apart, and relief between drainageways and adjacent ridges is less with increasing elevation. The dominant slope ranges from 10 to 30 percent, with some slopes of up to 50 percent along drainageways in some places. Granitic rocks, basalt, and rhyolitic rocks are the major sources of parent material. Soils are deep with large amounts of angular subsoil rock fragments.

5. Soils underlain by granitic rocks

This map unit occurs on mountain slopes and ridges. Soils occur under cold mixed coniferous and subalpine forest above 5,000 feet. Delineations are mainly in the Red River drainageway and near China Point, Nut Basin, Sawyer Ridge, and Sourdough Peak. This map unit comprises about 16 percent of the survey area and consists of about 70 percent Andic Cryochrepts, 15 percent Entic Cryandepts, and 15 percent soils of minor extent.

The Andic Cryochrepts have loess surface layers that have been influenced by volcanic ash and are 7- to 14-inches thick. These soils occur on southerly aspects, ridges, and upper slopes and have thin cobbly sandy loam subsoils and very gravelly loamy sand or sand substrata. The Entic Cryandepts have surface layers that have been influenced by volcanic ash and are 14- to 20-inches thick. These soils occur on northerly aspects and lower slopes.

The Aquepts and Typic Cryandepts are soils of minor extent in moist draws and on grassy balds. The Dystric Cryochrepts are soils of minor extent on steep southerly aspects.

Timber productivity is low to moderate. Soils tend to be stable. The hazard of erosion is severe if lower soil layers are exposed by logging or by road

construction. Soils store large amounts of water and release it slowly as streamflow.

6. Soils underlain by basalt or rhyolitic rocks

This map unit occurs on mountain slopes and ridges. Soils occur under cold mixed coniferous and subalpine forest above 5,000 feet. Delineations occur mainly west of the Salmon River and near Dairy Mountain. This map unit comprises about 1 percent of the survey area and consists of about 60 percent Mollic Cryoboralfs, 25 percent Dystric Cryochrepts, and 15 percent soils of minor extent.

The Mollic Cryoboralfs have dark-colored surface layers, subsoil clay accumulations, and very gravelly loam substrata. These soils occur on gentle slopes.

The Dystric Cryochrepts have surface layers that have been influenced by volcanic ash. These surface layers occur on steep slopes, are 4- to 14-inches thick, and are mixed with underlying material.

The Andeptic Cryoboralfs are soils of minor extent on gentle slopes. The Typic Cryandepts are soils of minor extent on grassy balds.

Soils tend to be stable. The hazard of erosion is slight if lower soil layers are exposed by logging or by road construction. Timber productivity is low to moderate. Soils store large amounts of water and release it slowly as streamflow.

Soils on Glacial Cirques and Troughs

The landscape is characterized by glacial cirques, U-shaped glacial valleys, and moraines, at more than 5,000 feet. Vegetation is cold mixed coniferous and subalpine forests. Slope ranges from 10 to 30 percent on glacial trough bottoms and in cirque basins. Slope ranges from 40 to more than 100 percent on glacial cirque headwalls and trough walls. Some cirque basins contain small lakes or wet meadows. Weakly weathered hard bedrock underlies glacial cirque headwalls and trough walls. Deep deposits of glacial till occur in cirque basins and glacial trough bottoms and on moraines.

7. Soils underlain by hard bedrock or glacial till

This map unit occurs mainly in the Seven Devils Mountains around Elk Mountain, Pilot Knob, Three Prong Mountain, and Roundtop. This map unit comprises about 5 percent of the survey area and consists of about 40 percent Andic Cryochrepts, 35 percent Dystric Cryochrepts, 5 percent rock outcrop, and 20 percent soils of minor extent.

The Andic Cryochrepts have loess surface layers that have been influenced by volcanic ash and are 7- to 14-inches thick. These soils occur on moraines and in trough bottoms and have thin gravelly sandy loam subsoils and very gravelly or very cobbly loamy sand or sand substrata.

The Dystric Cryochrepts have surface layers formed in loess mixed with underlying material. These soils occur on trough walls and cirque headwalls.

Rock outcrop occurs on cirque headwalls and trough walls.

The Entic Cryandepts are soils of minor extent in trough bottoms and cirque basins. The Typic Cryandepts are soils of minor extent in moist draws and wet depressions. The Entic Cryumbrepts are soils of minor extent on cirque headwalls and trough walls under open subalpine forest and on grassy balds.

Glaciated lands are scenic and have relatively high value for recreation. These glaciated areas yield about 60 percent of precipitation as streamflow and are important watersheds. Timber productivity is limited by the cold climate and a short growing season.

Soils on Steep Mountain Slopes and Stream Breaklands

The landscape is characterized by steep and very steep slopes adjacent to major streams. Slopes range from 45 to more than 100 percent and are straight or concave. The drainageway pattern is parallel with low-order drainageways that are tributary to much larger streams at the base of these slopes. Low-order drainageways have very steep channels with bedrock bottoms and occur in V-shaped draws.

8. Soils underlain by basalt or rhyolitic rocks, dry

This map unit occurs on steep mountain slopes and stream breaklands in the Salmon River drainageway, mainly on southerly aspects below 6,000 feet. Vegetation is grassland or open dry coniferous forest. This map unit comprises about 3 percent of the survey area and consists of about 40 percent Lithic Ultic Argixerolls, 35 percent Ultic Argixerolls, 20 percent rock outcrop, and 5 percent soils of minor extent.

The Lithic Ultic Argixerolls are 4- to 20-inches deep over bedrock. These soils have dark-colored surface layers, subsoil clay accumulations, and very gravelly or very cobbly clay loam or loam subsoils. The Lithic Ultic Argixerolls occur near rock outcrop on very steep slopes.

The Ultic Argixerolls are 20- to more than 60-inches deep. These soils occur under grassland

and open dry coniferous forest and have dark-colored surface layers, subsoil clay accumulations, and very gravelly or very cobbly clay loam or loam subsoils.

Rock outcrop occurs at ridge points and on very steep slopes.

The Typic Haploxerolls are soils of minor extent.

Livestock grazing and wildlife habitat are the major uses of this map unit. Timber productivity is low. Steep slopes limit livestock access to forage and limit tractor operation. The hazard of erosion is slight for material exposed by road construction. Sediment is transported rapidly through the drainageway system to larger streams at the base of the slope.

9. Soils underlain by basalt or rhyolitic rocks, moist

This map unit occurs on steep mountain slopes and stream breaklands in the Salmon River drainageway, mainly on northerly aspects. Vegetation is dry mixed coniferous and cold mixed coniferous forest. This map unit comprises about 4 percent of the survey area and consists of about 70 percent Ultic Argixerolls, 20 percent Dystric Cryochrepts, and 10 percent soils of minor extent.

The Ultic Argixerolls have dark-colored surface layers, subsoil clay accumulations, and very gravelly or very cobbly clay loam or loam substrata. These soils occur under dry mixed coniferous forest below 5,000 feet.

The Dystric Cryochrepts have surface layers that have been influenced by volcanic ash. These surface layers are 4- to 14-inches thick and are mixed with underlying material. The Dystric Cryochrepts occur under cold mixed coniferous forest above 5,000 feet.

The Typic Cryumbrepts are soils of minor extent in moist draws. The Dystric Xerochrepts are soils of minor extent at ridge points.

Timber productivity is moderate. Steep slopes limit tractor operation. The hazard of erosion is slight if lower soil layers are exposed by logging or by road construction. Sediment is delivered rapidly through the drainageway system to the larger stream at the base of the slope.

10. Soils underlain by granitic rocks, dry

This map unit occurs on steep mountain slopes and stream breaklands on southerly aspects below 6,000 feet. Vegetation is grassland or open dry coniferous forest. Delineations are mainly in the Salmon River drainageway and on the South Fork of the Clearwater River. This map unit comprises about 4 percent of the survey area and consists of about 57 percent Ultic Haploxerolls, 13 percent Lithic Ultic Haploxerolls, 20 percent rock outcrop, and 10 percent soils of minor extent.

The Ultic Haploxerolls have dark-colored surface layers, thin sandy loam subsoils, and gravelly sand substrata. These soils occur on side slopes and in draws.

The Lithic Ultic Haploxerolls are 4- to 20-inches deep over bedrock. These soils occur near rock outcrop at ridge points.

Rock outcrop occurs at ridge points and on very steep slopes adjacent to streams. The Dystric Xerochrepts are soils of minor extent at ridge points.

Livestock grazing and wildlife habitat are the major uses of this map unit. Timber productivity is low. Steep slopes limit livestock access to forage and limit tractor operation. The hazard of erosion is slight for material exposed by road construction. Sediment is transported rapidly through the drainageway system to larger streams at the base of the slope.

11. Soils underlain by granitic rocks, moist

This map unit occurs on steep mountain slopes and stream breaklands along the Salmon River, the South Fork of the Clearwater River, and the Selway River. This map unit comprises about 28 percent of the survey area and consists of about 45 percent Typic Dystrochrepts, 17 percent Typic Vitranepts, 18 percent Dystric Cryochrepts, and 20 percent soils of minor extent.

The Typic Dystrochrepts have surface layers formed in loess that has been influenced by volcanic ash mixed with underlying material. These soils have gravelly loam or sandy loam subsoils and gravelly or very gravelly sandy loam or loamy sand substrata. The Typic Dystrochrepts occur on upper slopes and southerly aspects under mixed coniferous and moist mixed coniferous forest below 5,000 feet.

The Typic Vitrandepts have surface layers that have been influenced by volcanic ash and are 14- to 20-inches thick. These soils occur on northerly aspects and lower slopes under moist mixed coniferous forest below 5,000 feet.

The Dystric Cryochrepts have surface layers formed in loess influenced by volcanic ash mixed with underlying material, thin very gravelly sandy loam subsoils, and very gravelly or very cobbly loamy sand or sand substrata. These soils occur under cold mixed coniferous and subalpine forest above 5,000 feet.

The Haplumbrepts and Cryumbrepts are soils of minor extent in moist draws. The Dystric Xerochrepts are soils of minor extent at ridge points on southerly aspects.

Timber productivity is moderate to high on the Typic Dystrochrepts, high on the Typic Vitrandepts, and low to moderate on the Dystric Cryochrepts. Steep slopes limit tractor operation. The hazard of erosion is severe if lower soil layers are exposed by logging or by road construction. Sediment is delivered rapidly through the drainageway system to the larger stream at the base of the slope.

Detailed Soil Map Units

This section describes each map unit in detail. The map unit descriptions, along with the soil maps, can be used to determine the suitability and potential of a unit for major land uses within the survey area, to plan land use and the development of resources, and to help protect and maintain the quality of the environment. The acreage of each map unit is given in Table 11. An alphabetic list of National Cooperative Soil Survey map unit names is provided in Table 12. Many of the terms used to describe map units are defined in the "Glossary." More information for each map unit is given in the "Use and Management of the Soils" section.

Most soils are mapped at the family level of taxonomy, but a few are mapped at the higher levels. Map units in which soils were mapped at the family level are named using subgroup reference taxa for brevity. Table 3 gives the soil taxonomic units by map unit.

The map unit description format presents information in sections. The content of each section is described in the following paragraphs. An introductory paragraph provides a summary of the map unit information. This paragraph describes landform, elevation, vegetation, and parent material source for lower soil layers.

Landform describes properties of the landform in the map unit. Slope gradients and shape, the pattern and density of drainageways, channel gradients, and regolith water storage capacity are given. Seeps, springs, lakes, and other landform features are described when present.

Vegetation and *Habitat Type Composition and Distribution* describe the typical existing vegetation and the composition and distribution of habitat types. Major and similar habitat types are in the same habitat type group and have similar interpretive values for survey objectives. Included habitat types have productivity similar to that of the major habitat types but can have different stand compositions. Highly dissimilar habitat types have significantly different potential productivity or limitations to forest regeneration than the major habitat types.

Characteristics of the Soils describes the soil properties that are of particular importance to use and management. The properties given are the same for the dominant soils and the similar soils in the map unit. The texture of the surface layer; thickness of the surface layer when it is loess that has been influenced by volcanic ash; content of rock fragments in the subsoil; drainage; and depth to bedrock, if less than 60 inches, are important properties in this survey area. When the map unit is a complex, the most important properties of the soils and any relationship of the soils to topographic position or vegetation are described.

Map Unit Composition describes the soils that are similar and dissimilar to the dominant soils. This paragraph gives the percentage of the map unit typically occupied by the dominant and similar soils and by the dissimilar soils. The location and principal interpretive difference are given for dissimilar soils.

Representative Profile(s) of the soils describes the dominant soils in the map unit. The representative profile is not necessarily the same as the representative pedon for the taxa.

Management gives suitability and limitations for common land uses. Timber, roads, range, watershed, and riparian area limitations are described.

10A99—Cryaquepts-Cryumbrepts complex, stream bottoms

This map unit is on stream bottoms. Elevation ranges from 2,100 to 7,600 feet. Vegetation consists of sedge meadows. The lower soil layers formed in stratified alluvial deposits.

Landform

The dominant slopes have gradients of 0 to 10 percent. The map unit delineations parallel streams, and most of the area is within 100 feet of a stream. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of sedges, rushes, twinflower, marsh marigold, Jeffrey shooting star, Sitka burnet, Canby's licorice-root, elephanthead lousewort, northern false hellebore, Modoc bog orchid, and northern licorice-root.

Habitat Type Composition and Distribution

The major plant communities are sedge meadows. These community types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Subalpine fir/bluejoint, grand fir/arrowleaf groundsel, and western red cedar/ladyfern are on low hummocks.

Characteristics of the Soils

The major soils have fluctuating water tables, which usually rise to or above the surface in the spring. The substrata are sandy. Soil properties vary with water table conditions. Soils with water tables at or near the surface have mottled or gleyed subsoils; soils with fluctuating, well-aerated water tables do not.

Map Unit Composition

Cryaquepts have mottled or gleyed subsoils and do not have organic surface layers more than 16-inches thick. The similar soils are Borosaprists that have organic layers more than 16-inches thick. These soils are in about 60 percent of this map unit.

Cryumbrepts do not have mottled or gleyed subsoils. These soils are in about 40 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Cryumbrepts have a very dark brown and dark brown loam surface layer. This surface layer is about 15-inches thick. The subsoil is dark yellowish brown loam about 13-inches thick. The substratum to a depth of 60 inches or more is dark brown stratified gravelly loamy sand and sand.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

This map unit contains wet soils that limit road location and construction. Excavation may intercept large amounts of ground water. Roads require suitable subgrade material because of wet soils with low strength. Material exposed by road construction tends to slough on steep cutbanks. Unsurfaced roads rut and erode and are slippery when wet.

Range

The potential native plant community produces about 1,500 pounds per acre per year of air-dry forage. Grazing should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

The major concern of watershed management is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Disturbing the soils on or adjacent to streambanks may increase stream sediment. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Most of this map unit is a riparian area and is potentially important to wildlife, fisheries, and watershed. Conservation practices to protect riparian values may be required when managing adjacent uplands.

10AD9—Cryumbrepts-Cryaquepts-Andic Cryochrepts complex, stream bottoms

This map unit is on stream bottoms. Elevation ranges from 2,500 to 7,500 feet. Vegetation consists of a mosaic of wet forest and sedge meadows in the low areas and subalpine forest at the slightly higher elevations. The lower soil layers formed in stratified alluvial deposits.

Landform

The dominant slopes have gradients of 0 to 10 percent, but slopes as high as 30 percent are on included alluvial fans. The map unit delineations parallel streams, and most of the area is within 100 feet of a stream. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of stands of subalpine fir, Engelmann spruce, and lodgepole pine. Common understory plants in the low areas are arrowleaf groundsel, stream boykinia, Carolina bugbane, northern licorice-root, Jeffrey shooting star, Labrador tea, and Sitka alder. Common understory plants at the slightly higher elevations are menziesia, blue huckleberry, beargrass, and queencup beadlily. Common plants in meadows are sedges, rushes, Jeffrey shooting star, and Canby's licorice-root.

Sedge meadows and sedge/moss meadows are in the low areas with water tables near the surface. These plant communities are in about 30 percent of this map unit.

Habitat Type Composition and Distribution

The major habitat types in the low areas above 5,000-feet elevation are subalpine fir/bluejoint and subalpine fir/twisted stalk. Below 5,000-feet elevation, grand fir/arrowleaf groundsel is the major habitat type. Similar habitat types in the Selway River drainageway are western red cedar/lady fern and western red cedar/maidenhair fern. These habitat types are in about 45 percent of this map unit.

The major habitat types at the slightly higher elevations are subalpine fir/menziesia and subalpine fir/beargrass. Western red cedar/queencup beadlily and western red cedar/wild ginger are included in the Selway River drainageway. Grand fir/queencup beadlily and grand fir/wild ginger are included in the southern part of the survey area below 5,000-feet elevation. These habitat types are in about 25 percent of this map unit.

Characteristics of the Soils

Soil properties vary with topographic position. Soils in the low areas have fluctuating water tables, which usually rise to or above the surface in the spring. These soils are subject to an occasional hazard of flooding. The substrata are sandy. Soils at the slightly higher elevations are well drained. The substrata are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Cryumbrepts are in the low areas and do not have mottled or gleyed subsoils. These soils are in about 45 percent of this map unit.

Cryaquepts are in the low areas and have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

Andic Cryochrepts are at the slightly higher elevations and have volcanic ash-influenced loess surface layers. These soils are in about 25 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Cryumbrepts have a very dark brown and dark brown loam surface layer. This surface layer is about 15-inches thick. The subsoil is dark yellowish brown loam about 13-inches thick. The substratum to a depth of 60 inches or more is dark brown stratified gravelly loamy sand and sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Andic Cryochrepts have a brown to dark brown silt loam surface layer. This surface layer is about 5-inches thick. The upper part of the subsoil is yellowish brown gravelly silt loam about 8-inches thick. The lower part of the subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly coarse sandy loam.

Management

Timber

Sampled stands have annual production of 40±33 cubic feet per acre per year in the low areas and 37±5 cubic feet per acre per year at the slightly higher elevations. Map unit productivity is reduced by sedge meadows. Tractor operation in the low areas is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Fluctuating water tables are common in the low areas and may limit forest regeneration. A hazard of windthrow is associated with wet soils. Frost pockets in the low areas also limit forest regeneration.

Roads

This map unit contains wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in the low areas. Roads require suitable subgrade material across the low areas because of wet soils with low strength. Material exposed by road construction tends to slough on steep cutbanks. Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production at the slightly higher elevations ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. In the low areas, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing of the low areas should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

The major concern of watershed management is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Disturbing the soils on or adjacent to streambanks may increase stream sediment. Excavation for road construction and ruts caused by equipment operation may intercept ground water. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Most of this map unit is a riparian area and is potentially important to wildlife, fisheries, and watershed. Conservation practices to protect riparian values may be required when managing adjacent uplands.

10AUU—Entisols, sandy substrata; Riverwash; and Dumps, mine

This map unit contains mine spoils and low-lying flood plains. The lower soil layers formed in alluvial deposits that have been placer mined or that are subject to a frequent hazard of flooding.

Landform

The dominant slopes have gradients of 0 to 10 percent, but slopes as high as 30 percent are on mine spoil banks. The delineations parallel streams, and most of the area is within 100 feet of a stream. The stream channel gradients are low, and channels have high sediment storage capacity.

Vegetation

The delineations may be barren, densely forested, sparsely forested, or support shrub communities.

Characteristics of the Soils

The major soils are well drained or moderately well drained. The substrata are highly stratified.

Map Unit Composition

Entisols do not have subsoils. A weakly developed surface layer overlies substratum material. The similar soils are Inceptisols that have weakly developed subsoils.

Riverwash and mine dumps are barren deposits of sand or gravel. Riverwash consists of low-lying frequently flooded sandbars along large streams. Mine dumps are barren placer mine spoil banks composed of sand, gravel, and cobble.

The delineations may contain soil and riverwash or mine dumps or be entirely soil, riverwash, or mine dumps.

Representative Profile

Entisols have a dark brown gravelly sandy loam surface layer. This surface layer is about 8-inches thick. The substratum to a depth of 60 inches or more is yellowish brown, yellowish brown and reddish yellow highly stratified sand, extremely cobbly sand, and very gravelly sand.

Management

On-site evaluation is required to determine suitability for timber production, roads, and range. Most delineations are riparian areas and are potentially important to wildlife, fisheries, and watershed. Conservation practices to protect riparian values may be required when managing adjacent uplands.

13AUU—Mollisols, Inceptisols, and Alfisols; terraces and alluvial fans

This map unit is on terraces and alluvial fans. Elevation ranges from 1,400 to 3,300 feet. Natural

vegetation consists of forest or grassland, but many delineations are cultivated. The lower soil layers formed in alluvial deposits. This map unit is in small, scattered delineations along the Salmon, South Fork of the Clearwater, and Selway Rivers.

Landform

The dominant slopes have gradients of 5 to 30 percent on terrace surfaces and alluvial fans. Slopes may be higher than 40 percent on terrace risers.

The drainage pattern is poorly developed with shallow first-order drainageways originating in this map unit. The streams from adjacent uplands may deeply dissect this map unit. Most of this map unit is within 500 feet of a stream.

Vegetation

The delineations may support forest or grassland. Most delineations along the Salmon River support grassland. Along the South Fork of the Clearwater, most delineations support forest on grand fir series habitat types. Along the Selway River, most delineations support forest on western red cedar series habitat types.

Characteristics of the Soils

Soil properties vary with vegetation. Soils under grassland have dark-colored surface layers. The substrata are loamy and contain 60 to 80 percent rock fragments. Soil under forest have light-colored surface layers with and without subsoil clay accumulations. The lower soil layers are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Mollisols are under grassland.

Inceptisols are under forest and do not have subsoil clay accumulations.

Alfisols are under forest and have subsoil clay accumulations.

Grassland delineations are Mollisols. Forested delineations may have Inceptisols or Alfisols or both.

Representative Profiles

Mollisols have a very dark brown very gravelly loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown very cobbly loam about 35-inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly loam.

Inceptisols have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark brown silt loam about 12-inches thick. The lower part of the subsoil is brown to dark brown very cobbly loam about 25-inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam.

Alfisols have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is weak red clay loam about 10-inches thick. The lower part of the subsoil to a depth of 60 inches or more is reddish brown sandy clay loam and gravelly sandy clay loam.

Management

Timber

Timber productivity and limitations to forest regeneration in forested delineations should be determined on site. The terrain is well suited to tractor operation.

Roads

Roads usually perform well with ordinary construction and maintenance practices, but on-site evaluation is recommended.

Range

Grassland delineations have high forage productivity. There are no limitations to livestock grazing. Suitability for transitory range on forested delineations should be evaluated on site.

Watershed

Hazards of erosion should be evaluated on site. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Some delineations contain riparian areas. The need for conservation practices to protect riparian values should be evaluated on site.

22A31—Andic Dystrochrepts, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 3,300 to 5,600 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Low relief rolling uplands have broadly

rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are in frost pockets and above about 4,000-feet elevation. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, and rose.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower slopes and grand fir/beargrass on southerly aspects. Similar habitat types are grand fir/twinflower and grand fir/wild ginger. These habitat types are in about 85 percent of this map unit.

Highly dissimilar habitat types are in about 15 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. The substrata are loamy and contain 0 to 50 percent rock fragments.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have loess surface layers 7- to 14-inches thick, 0 to 35 percent subsoil rock fragments, and do not have subsoil clay accumulations. The similar soils are Typic Vitrandepts, medial over loamy, mixed, frigid; Andic Dystrochrepts, loamy-skeletal, mixed, frigid; or Eutric Glossoboralfs, coarse-loamy, mixed. They have loess surface layers 14- to 18-inches thick, 35 to 50 percent subsoil rock fragments, or have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, sandy, mixed, frigid, are at ridge points and on southerly aspects. These soils have thin subsoils, coarse-textured substrata, and lower timber productivity than the dominant soils. Andic Haplumbrepts, coarse-loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown loam about 30-inches thick. The substratum to a depth of 60 inches or more is yellowish brown gravelly sandy loam.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22A33—Andic Dystrochrepts-Aquepts complex, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 3,300 to 5,300 feet. Vegetation

consists of mixed coniferous forest and wet forest. The lower soil layers formed in material derived from granitic rocks and Tertiary sediments.

Landform

The dominant slopes have gradients of 10 to 35 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation on side slopes and ridges consists of mixed stands of grand fir, Douglas-fir, lodgepole pine, western larch, and Engelmann spruce. Common understory plants on side slopes and ridges are beargrass, northern twinflower, goldthread, queencup beadlily, grouse whortleberry, blue huckleberry, and bunchberry dogwood. Grand fir, lodgepole pine, and Engelmann spruce are in moist draws. Common understory plants in moist draws and wet depressions are Sitka alder, sedges, arrowleaf groundsel, and stream boykinia.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/beargrass on southerly aspects and grand fir/queencup beadlily on northerly aspects. A similar habitat type is grand fir/wild ginger. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel is in moist draws. This habitat type is in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained. The substrata are loamy and contain 0 to 50 percent rock fragments. Soils in moist draws and depressions have fluctuating water tables, which usually rise to or above the surface in the spring. The substrata are sandy.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, are on side slopes and ridges. These soils have 0 to 35 percent subsoil rock fragments and do not have subsoil clay accumulations. The similar soils are Andic Dystrochrepts, loamy-skeletal, mixed, frigid, or Eutric Glossoboralfs, coarse-loamy, mixed. They have 35 to 60 percent subsoil rock fragments or subsoil clay accumulations. These soils are in about 70 percent of this map unit.

Aquepts are in moist draws and depressions. These soils have light-colored surface layers and mottled or gleyed subsoils. The similar soils are Umbrepts. They have dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown loam, about 30-inches thick. The substratum to a depth of 60 inches or more is brown gravelly sandy loam.

Aquepts have a dark gray silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is gray and dark gray clay loam and gravelly sandy clay loam mottled with yellowish red about 21-inches thick. The substratum to a depth of 60 inches or more is dark gray gravelly loamy sand.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws. Site productivity is highly dependent on loess surface layers. On side slopes and ridges, tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration. In moist draws, tractor operation is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Fluctuating water tables and frost pockets are common in moist draws and limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist

draws and depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and depressions, cutbanks tend to slough. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have slight hazards of erosion on side slopes and ridges. The material exposed by road construction on side slopes and ridges has severe hazards of erosion. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

22A3C—Eutric Glossoboralfs, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 3,200 to 5,000 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from Tertiary sediments and metasedimentary rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, but slowly permeable subsoils perch water, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, ponderosa pine, and western larch. Lodgepole pine and Engelmann spruce are in frost pockets and above 4,000-feet elevation. Common understory plants are beargrass, blue huckleberry, northern twinflower, goldthread, snowberry, American trailplant, and bunchberry dogwood.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects, grand fir/queencup beadlily on northerly aspects and lower slopes, and grand fir/wild ginger on toeslopes and in depressions. A similar habitat type is grand fir/twinflower. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration. Douglas-fir/ninebark is on southerly aspects and at ridge points below 4,000-feet elevation. Douglas-fir/ninebark has lower timber productivity than the major habitat types.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 4- to 14-inches thick and subsoil clay accumulations. The lower soil layers are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Eutric Glossoboralfs, fine-loamy, mixed, do not have hard, brittle subsoils and have 0 to 35 percent subsoil rock fragments. The similar soils are Typic Fragiboralfs, fine-loamy, mixed, or Eutric Glossoboralfs, loamy-skeletal, mixed. They have hard, brittle subsoils or 35 to 60 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Dystrochrepts, coarse-loamy, mixed, frigid, are associated with material derived from granitic rock. These soils do not have slowly permeable subsoils that perch water. Aquic

Glossoboralfs, fine-loamy, mixed, are in moist draws. These soils have mottled or gleyed subsoils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, fine-loamy, mixed, have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark yellowish brown cobbly sandy loam and brown to dark brown very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown gravelly sandy clay loam.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to slough and erode on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22A41—Typic Vitrandepts, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 3,600 to 5,000 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 40 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western red cedar, Douglas-fir, and western larch. Engelmann spruce is in frost pockets. Pacific yew is a common tall shrub. Common understory plants are queencup beadlily, blue huckleberry, goldthread, starry false Solomon's seal, willow, thimbleberry, and sword hollyfern. Shrubs invade when openings are made in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on northerly aspects and lower slopes and western red cedar/wild ginger near draws and in depressions. Grand fir/wild ginger is included near draws and depressions. Grand fir/queencup beadlily is included on southerly aspects and at ridge points. These habitat types are in about 85 percent of this map unit.

Highly dissimilar habitat types are in about 15 percent of this map unit. Grand fir/arrowleaf groundsel and western red cedar/ladyfern are in moist draws and on lower slopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 14- to 20-inches thick. The substrata are sandy.

Map Unit Composition

Typic Vitrandepts, medial over loamy, mixed, frigid, have loess surface layers 14- to 20-inches thick, 0 to

35 percent subsoil rock fragments, and do not have subsoil clay accumulations. The similar soils are Andic Dystrochrepts, coarse-loamy, mixed, frigid; Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid; or Eutric Glossoboralfs, coarse-loamy, mixed. They have loess surface layers 10- to 14-inches thick, 35 to 60 percent subsoil rock fragments, or subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, coarse-loamy, mixed, frigid, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws and on lower slopes. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Typic Vitrandepts, medial over loamy, mixed, frigid, have a gravelly silt loam surface layer. This surface layer is about 15-inches thick. The upper 5 inches are very dark grayish brown, and the lower 10 inches are brown to dark brown. The subsoil is brown to dark brown gravelly coarse sandy loam about 22-inches thick. The upper substratum is light brownish gray sandy loam about 14-inches thick. The lower substratum to a depth of 60 inches or more is light yellowish brown gravelly loamy coarse sand.

Management

Timber

Sampled stands have annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Competition from understory vegetation limits forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22A4R—Eutric Glossoboralfs, low relief rolling uplands, basalt substratum

This map unit is on low relief rolling uplands. Elevation ranges from 3,000 to 4,400 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from basalt.

Landform

The dominant slopes have gradients of 10 to 30 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western red cedar, and Douglas-fir. Pacific Yew is a common tall shrub. Common understory plants are queencup beadlily, goldthread, beargrass, blue huckleberry, snowberry, Utah honeysuckle, baldhip rose, mountain maple, and northern twinflower. Shrubs invade when openings are made in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on northerly aspects and lower slopes and western red cedar/wild ginger near draws and in depressions. Grand fir/wild ginger is included near draws and in depressions. Grand fir/queencup beadlily is included on southerly aspects and at ridge points. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf

groundsel and western red cedar/ladyfern are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick and subsoil clay accumulations. The substrata are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Eutric Glossoboralfs, fine-loamy, mixed, have 0 to 35 percent subsoil rock fragments. The similar soils are Eutric Glossoboralfs, loamy-skeletal, mixed. They have 35 to 60 percent subsoil rock fragments. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Aquic Glossoboralfs, fine-loamy, mixed, are in moist draws. These soils have mottled subsoils and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, fine-loamy, mixed, have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark yellowish brown silt loam about 8-inches thick. The lower part of the subsoil is dark yellowish brown, brown and dark brown silty clay loam, and gravelly silty clay loam about 32-inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown very gravelly clay loam.

Management

Timber

Sampled stands have annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Competition from understory vegetation limits forest regeneration.

Roads

Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails, firelines, and the material exposed by road construction have moderate hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22A6Q—Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum

This map unit is on low relief rolling uplands. Elevation ranges from 5,800 to 6,300 feet. Vegetation consists of subalpine forest and wet forest. The lower soil layers on side slopes and ridges formed in material derived from moderately well-weathered granitic rocks. Some lower soil layers in moist draws and wet depressions formed in stratified alluvial deposits or material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock limits the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of stands of lodgepole pine with some subalpine fir. Common understory plants on side slopes and ridges are grouse whortleberry, beargrass, and blue huckleberry. Lodgepole pine, Engelmann spruce, and subalpine fir are in moist draws. Common understory plants in moist draws and wet depressions are sedges, Jeffrey shooting star, twinflower, marsh marigold, and elephanthead lousewort.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges

are subalpine fir/beargrass on northerly aspects and lower slopes and lodgepole pine/beargrass community types on southerly aspects and ridges. A similar habitat type is subalpine fir/menziesia. These habitat types are in about 70 percent of this map unit.

Subalpine fir/bluejoint is in moist draws. This habitat type is in about 15 percent of this map unit.

Highly dissimilar community types are in about 15 percent of this map unit. Sedge meadow communities are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. The substrata are sandy. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained and have substrata formed in weathered granitic rocks. Moderately well-weathered bedrock below 40 inches restricts root and water penetration. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts; they have thick dark-colored surface layers and do not have mottled and gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown gravelly loamy sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have annual production of 37±5 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On side slopes and ridges, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils. Frost pockets in draws also limits forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and wet depressions. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and wet depressions rut and erode when wet. Moderately well-weathered bedrock is exposed by road construction on side slopes and ridges. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production on side slopes ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry

forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have moderate hazards of erosion on side slopes and ridges. The material exposed by road construction on side slopes and ridges has very severe hazards of erosion. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

22A6X—Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum

This map unit is on low relief rolling uplands. Elevation ranges from 5,900 to 6,200 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 10 to 40 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock may limit the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of stands of lodgepole pine with some subalpine fir. Common understory plants are beargrass, grouse whortleberry, and blue huckleberry.

Habitat Type Composition and Distribution

The major habitat type is subalpine fir/beargrass on northerly aspects and lower slopes and lodgepole pine/beargrass community types on southerly aspects and ridges. A similar habitat type is subalpine fir/menziesia. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/bluejoint is in moist draws. This habitat type has higher timber productivity than the major habitat types. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. The substrata are sandy. Moderately well-weathered bedrock below 40 inches restricts root and water penetration.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material, 35 to 60 percent subsoil rock fragments, and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown gravelly sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Management

Timber

Sampled stands have annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Moisture stress may limit forest regeneration. Frost pockets in draws also limits forest regeneration.

Roads

Moderately well-weathered bedrock is exposed by road construction. This material is droughty, infertile, and erodible and tends to ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has very severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22A8B—Entic Cryandepts-Typic Cryandepts complex, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 4,800 to 6,200 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, Engelmann spruce, and western red cedar. Lodgepole pine and Douglas-fir are on upper side slopes. Common understory plants on upper side slopes and ridges are wild ginger, queencup beadlily, menziesia, blue huckleberry, and goldthread. Common understory plants in moist draws and depressions are Sitka alder, mountain maple, mountain red elderberry, baneberry, western coneflower, and arrowleaf groundsel.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major habitat type is grand fir/queencup beadlily. A similar habitat type on lower slopes is grand fir/wild ginger. Western red cedar/wild ginger and western red cedar/queencup beadlily are included in the Selway drainageway. These habitat types are in about 80 percent of the forest stands.

The major community types in moist draws and depressions contain alder and forbs. These community types are in about 30 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. These habitat types have higher timber productivity than the major habitat types. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. Soil properties vary with topographic position. Soils on upper side slopes and ridges have light-colored surface layers or thin dark-colored surface layers and loamy lower soil layers with 0 to 60 percent rock fragments. Soils in moist draws and depressions have thick dark-colored surface layers, are wet in the spring, and have sandy lower soil layers.

Map Unit Composition

Entic Cryandepts, medial over loamy, mixed, are on upper side slopes and ridges. These soils have loess surface layers 14- to 18-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, coarse-loamy, mixed, or Entic

Cryandepts, medial over loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 50 percent of this map unit.

Typic Cryandepts, medial over loamy, mixed, are in moist draws and depressions. These soils have loess surface layers 14- to 18-inches thick. The similar soils are Andic Cryumbrepts, coarse-loamy, mixed. They have loess surface layers 10- to 14-inches thick. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, loamy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material, 35 to 60 percent subsoil rock fragments, and lower timber productivity than the dominant soils. Andic Cryaquepts, coarse-loamy, mixed, are in wet depressions. These soils have mottled or gleyed subsoils and fluctuating water tables.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Entic Cryandepts, medial over loamy, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown gravelly sandy loam.

Typic Cryandepts, medial over loamy, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown cobbly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown gravelly loamy sand and cobbly loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year in forest stands. Map unit productivity is reduced by moist forest openings. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Competition from understory vegetation limits forest regeneration. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and depressions, cutbanks tend to slough. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 500 pounds per acre per year of air-dry forage. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have moderate hazards of erosion on side slopes and ridges. The material exposed by road construction has moderate hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Some moist draws, as well as included wet depressions, are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

22AH5—Andic Cryochrepts, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 4,800 to 6,200 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, lodgepole pine, Engelmann spruce, Douglas-fir, and western larch. Subalpine fir is in draws and above 5,500-feet elevation. Common understory plants are blue huckleberry, beargrass, goldthread, northern twinflower, queencup beadlily, grouse whortleberry, and wild ginger.

Habitat Type Composition and Distribution

The major habitat type is grand fir/queencup beadlily. A similar habitat type is grand fir/beargrass. Subalpine fir/beargrass and subalpine fir/menziesia are included above 5,000-feet elevation. Grand fir/wild ginger is included below 5,000-feet elevation. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. The substrata are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Andic Cryochrepts, loamy-skeletal, mixed, have loess surface layers 7- to 14-inches thick; subsoils are thick and do not have clay accumulations; and substrata are coarse textured. The similar soils are Entic Cryandepts, medial over loamy-skeletal, mixed; Andic Cryochrepts, sandy-skeletal, mixed; or Andeptic Cryoboralfs, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick, thin subsoils with coarse-textured substrata, or subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, loamy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown silt loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy sand.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22AH6—Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevation ranges from 4,600 to 6,400 feet. Vegetation consists of cold mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from granitic rocks. The lower soil layers in moist draws formed in stratified alluvial deposits and material derived from granitic rocks.

Landform

The dominant slopes have gradients of 0 to 35 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, lodgepole pine, Engelmann spruce, and Douglas-fir. Subalpine fir is in draws and above 5,000-feet elevation. Common understory plants on side slopes and ridges are beargrass, blue huckleberry, goldthread, northern twinflower, grouse whortleberry, queencup beadlily, menziesia, and prince's pine. Common understory plants in moist draws and wet depressions are arrowleaf groundsel, Sitka alder, sedges, rushes, Jeffrey shooting star, stream boykinia, monkeyflower, and marsh marigold.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on northerly aspects and lower slopes. Grand fir/wild ginger and subalpine fir/menziesia are included. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained and have loamy substrata with 0 to 60 percent rock fragments. Soils in moist draws and depressions have fluctuating water tables, which usually rise to or above the surface in the spring, and sandy substrata.

Map Unit Composition

Andic Cryochrepts, loamy-skeletal, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and thick subsoils with moderately coarse-textured substrata. The similar soils are Entic Cryandepts, medial over loamy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thinner subsoils and coarse-textured substrata. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, loamy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly sandy loam.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year on ridges and side

slopes and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On side slopes and ridges, moisture stress may limit forest regeneration on southerly aspects. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Forest regeneration is limited by frost pockets in moist draws and wet depressions. Fluctuating water tables are common in moist draws and may limit regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Roads require suitable subgrade material across moist draws and wet depressions because of seasonal wetness. In moist draws, cutbanks tend to slough. Unsurfaced roads in moist draws rut and erode when wet. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have slight hazards of erosion on side slopes and ridges. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

22AHQ—Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum, warm

This map unit is on low relief rolling uplands. Elevation ranges from 5,300 to 6,400 feet. Vegetation consists of cold mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from moderately well-weathered granitic rocks. The lower soil layers in moist draws and wet depressions formed in stratified alluvial deposits and material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 10 to 40 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock may limit the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, lodgepole pine, and grand fir. Western larch and Douglas-fir are on side slopes and ridges. Common understory plants on side slopes and ridges are beargrass, blue huckleberry, grouse whortleberry, goldthread, and prince's pine. Common understory plants in moist draws and wet depressions are sedges, Jeffrey shooting star, twinflower marsh marigold, Labrador tea, claspleaf twisted stalk, and arrowleaf groundsel.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat type on side slopes and ridges is grand fir/beargrass. A similar habitat type in frost pockets is subalpine fir/beargrass. These habitat types are in about 60 percent of this map unit.

Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws.

These habitat types are in about 20 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/queencup beadlily is on northerly aspects below about 5,500 feet. This habitat type has higher timber productivity than the major habitat types. Sedge meadows are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Soil properties vary with topographic position. Soils on side slopes and ridges are well-drained, and moderately well-weathered bedrock below 40 inches restricts root and water penetration. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring, and permeable substrata.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled and gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown gravelly loamy sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On side slopes and ridges, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Forest regeneration is limited by frost pockets in moist draws. Fluctuating water tables are common in moist draws and may limit regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and wet depressions. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws rut and erode when wet. On side slopes and ridges, moderately well-weathered bedrock is exposed by road construction. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Grazing of moist draws

and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have slight hazards of erosion on side slopes and ridges. The material exposed by road construction on side slopes and ridges has very severe hazards of erosion. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

22AHR—Andeptic Cryoboralfs, low relief rolling uplands

This map unit is on low relief rolling uplands. Elevations range from 4,500 to 6,200 feet, with some delineations as low as 2,700 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from basalt.

Landform

The dominant slopes have gradients of 5 to 25 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of a sparse pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, western larch, Douglas-fir, subalpine fir, lodgepole pine, and ponderosa pine. Common understory plants are goldthread, blue huckleberry, beargrass, prince's pine, northern twinflower, darkwoods violet, and Piper's anemone.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on upper side slopes, ridges, and southerly aspects; grand fir/queencup beadlily on northerly aspects and lower slopes; and subalpine fir/beargrass in frost pockets. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Douglas-fir/ninebark is on southerly aspects below about 4,000-feet elevation. Moisture stress may limit forest regeneration. Grand fir/arrowleaf groundsel and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 20-inches thick. The lower soil layers are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Andeptic Cryoboralfs, loamy-skeletal, mixed, have subsoil clay accumulations and 35 to 60 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Andeptic Cryoboralfs, fine-loamy, mixed. Unlike the Andeptic Cryoboralfs, the Andic Cryochrepts do not have subsoil clay accumulations or 0 to 35 percent subsoil rock fragments. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Aquic Cryoboralfs, fine-loamy, mixed, are in moist draws. These soils have gleyed or mottled subsoils and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andeptic Cryoboralfs, loamy-skeletal, mixed, have a brown to dark brown gravelly silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is brown to dark brown and dark yellowish brown very gravelly silt loam about 18-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark yellowish brown very gravelly silty clay loam and brown to dark brown extremely gravelly clay loam.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Frost pockets in

draws limits forest regeneration. On southerly aspects, moisture stress may also limit forest regeneration.

Roads

Unsurfaced roads are rough and difficult to blade because of large stones in areas. On southerly aspects, material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

22AHX—Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum, warm

This map unit is on low relief rolling uplands. Elevation ranges from 5,300 to 6,000 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Low relief rolling uplands have broadly rounded ridges, straight to convex side slopes, and broad and slightly concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock may limit the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of lodgepole pine, subalpine fir, Engelmann spruce, grand fir, western larch, and Douglas-fir. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, menziesia, prince's pine, and pinegrass.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on side slopes and ridges and grand fir/queencup beadlily on northerly aspects. A similar habitat type is grand fir/blue huckleberry. Subalpine fir/beargrass is included near draws. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Moderately well-weathered bedrock below 40 inches restricts root and water penetration.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, have loess surface layers 7- to 14-inches thick. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year. Site productivity

is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Moisture stress may limit forest regeneration.

Roads

Moderately well-weathered bedrock is exposed by road construction. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has very severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24A3N—Andic Dystrochrepts, rolling uplands, weathered granitic substratum

This map unit is on high relief rolling uplands. Elevation ranges from 3,500 to 4,800 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 10 to 40 percent. High relief rolling uplands have narrow to rounded ridges, straight to convex side slopes, and concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock may limit the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western larch, Douglas-fir, ponderosa pine, and Engelmann spruce. Common understory plants are beargrass, northern twinflower, goldthread, queencup beadlily, and starry false Solomon's seal.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on lower side slopes and northerly aspects. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Moderately well-weathered bedrock below 40 inches restricts root and water penetration.

Map Unit Composition

Andic Dystrochrepts, sandy, mixed, frigid, have loess surface layers 7- to 14-inches thick. The similar soils are Typic Vitrandepts, medial over sandy, mixed, frigid. They have loess surface layers 14- to 18-inches thick. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, sandy, mixed, frigid, are at ridge points and on steep southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Haplumbrepts, sandy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Dystrochrepts, sandy, mixed, frigid, have a dark brown loam surface layer about 12-inches thick. The subsoil is brown to dark brown. The upper 14 inches are sandy loam, and the lower 11 inches are loamy sand. The upper substratum is brown to dark brown sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered granitic bedrock.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Moderately well-weathered bedrock is exposed by road construction. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has very severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24AH5—Andic Cryochrepts, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 4,800 to 6,300 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. High relief rolling uplands have narrow to rounded ridges, straight to convex side slopes, and concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, lodgepole pine, Engelmann spruce, Douglas-fir, and western larch. Subalpine fir is in draws and above 5,500-feet elevation. Common understory plants are blue huckleberry, goldthread, beargrass, northern twinflower, queencup beadlily, and grouse whortleberry.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower side slopes and grand fir/beargrass on ridges and southerly aspects. Subalpine fir/beargrass and subalpine fir/menziesia are included in places. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, coarse-loamy, mixed, have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over loamy, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, coarse-loamy, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, coarse-loamy, mixed, have a brown to dark brown silt loam surface layer. This

surface layer is about 5-inches thick. The subsoil is yellowish brown gravelly fine sandy loam about 13-inches thick. The upper substratum is brownish yellow very gravelly sandy loam about 12-inches thick. The lower substratum to a depth of 60 inches or more is brownish yellow and yellow gravelly loamy sand.

Management

Timber

Sampled stands have annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24C33—Andic Dystrochrepts-Aquepts complex, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 4,000 to 5,000 feet. Vegetation consists of mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from granitic rocks. The lower soil layers in moist draws and wet depressions formed in stratified alluvial deposits and material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation on side slopes and ridges consists of mixed stands of grand fir, western larch, Douglas-fir, and western red cedar. Common understory plants are queencup beadlily, goldthread, beargrass, and menziesia. Grand fir, lodgepole pine, Engelmann spruce, and western red cedar are in moist draws. Common understory plants in moist draws and wet depressions are Sitka alder, sedges, ladyfern, arrowleaf groundsel, and stream boykinia.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/queencup beadlily on northerly aspects and lower side slopes and grand fir/beargrass on southerly aspects and ridges. A similar habitat type is grand fir/wild ginger. Western red cedar/queencup beadlily and western red cedar/wild ginger are included in a few delineations in the Selway River drainageway. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel is in moist draws. This habitat type is in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities and sedge meadows are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick and sandy substrata. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, are on side slopes and ridges. They have 0 to 35 percent subsoil rock fragments and do not have subsoil clay accumulations. The similar soils are Andic Dystrochrepts, loamy-skeletal, mixed, frigid, or Eutric Glossoboralfs, coarse-loamy, mixed. They have 35 to 60 percent subsoil rock fragments or subsoil clay accumulations. These soils are in about 70 percent of this map unit.

Aquepts are in moist draws and wet depressions. These soils have light-colored surface layers and mottled or gleyed subsoils. The similar soils are Umbrepts; they have dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown loam about 30-inches thick. The substratum to a depth of 60 inches or more is brown loamy sand.

Aquepts have a dark gray and gray surface layer. This surface layer is about 13-inches thick. The upper 4 inches are silt loam, and the lower 9 inches are clay loam and gravelly sandy clay loam mottled with yellowish red. The subsoil is dark gray mottled with yellowish red gravelly sandy clay loam about 12-inches thick. The substratum to a depth of 60 inches or more is dark gray gravelly loamy sand.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws. Site productivity is highly dependent on loess surface layers. On side slopes and ridges, tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. In moist draws and wet depressions, tractor operation is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration. Forest regeneration is limited by frost pockets in moist draws. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws, cutbanks tend to slough. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on side slopes and ridges. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit.

Conservation practices to protect riparian values may be required when managing adjacent uplands.

24C38—Andic Dystrochrepts-Typic Dystrochrepts complex, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 3,200 to 5,800 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are in frost pockets and above 4,000-feet elevation. Common understory plants are beargrass, blue huckleberry, northern twinflower, and goldthread.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and grand fir/beargrass on southerly aspects. Similar habitat types are grand fir/twinflower and grand fir/wild ginger. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Douglas-fir/mallow ninebark and Douglas-fir/pinegrass are on some dry ridges and southerly aspects. Douglas-fir/dwarf huckleberry is in frost pockets in the eastern half of the survey area. These habitat types have lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 4- to 14-inches thick. The substrata are loamy and contain 0 to 50 percent rock fragments. Soil properties vary with topographic position. Soils on northerly aspects and lower slopes have loess surface layers 7- to 14-inches thick. Soils on southerly aspects and mid to upper slopes have thinner loess surface layers that are often mixed with subsoil material.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, are on northerly aspects and lower slopes. These soils do not have subsoil clay accumulations. The similar soils are Eutric Glossoboralfs, coarse-loamy, mixed. They have subsoil clay accumulations. These soils are in about 50 percent of this map unit.

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects and mid to upper slopes. These soils have 0 to 35 percent subsoil rock fragments. The similar soils are Typic Dystrochrepts, loamy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, sandy, mixed, frigid, are associated with materials derived from granitic rocks. These soils have coarser textured substrata and lower timber productivity than the dominant soils. Andic Haplumbrepts, coarse-loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown loam about 30-inches thick. The substratum to a depth of 60 inches or more is yellowish brown gravelly sandy loam.

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are sandy loam. The substratum to a depth of 60 inches or more is brown to dark brown gravelly sandy loam.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by

compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on northerly aspects and moderate hazards of erosion on southerly aspects. The material exposed by road construction has moderate hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24C3C—Eutric Glossoboralfs, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 2,300 to 5,200 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in materials derived from Tertiary sediments and metasedimentary rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low to moderate. Perched water tables formed above slowly permeable subsoils.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, ponderosa pine, and western red cedar. Engelmann spruce and lodgepole pine are in frost pockets and above about 4,000-feet elevation. Common understory plants are beargrass, blue huckleberry, northern twinflower, goldthread, American trailplant, western meadowrue, Saskatoon serviceberry, creambush oceanspray, and snowberry.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on mid to lower side slopes and northerly aspects and grand fir/beargrass on ridges, upper side slopes, and southerly aspects. Similar habitat types are grand fir/twinflower and grand fir/wild ginger. Western red cedar/queencup beadlily and western red cedar/wild ginger are included in a few delineations in the Selway River drainageway. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Douglas-fir/mallow ninebark is on some dry ridges and southerly aspects. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 4- to 14-inches thick and subsoil clay accumulations. The lower soil layers are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Eutric Glossoboralfs, loamy-skeletal, mixed, do not have hard, brittle subsoils and have 35 to 80 percent subsoil rock fragments. The similar soils are Typic Fragiboralfs, loamy-skeletal, mixed, or Eutric Glossoboralfs, fine-loamy, mixed. They have hard, brittle subsoils or 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Dystrochrepts, coarse-loamy, mixed, frigid, are formed in material derived from granitic rocks. These soils do not have slowly permeable subsoils that perch water. Aquic Glossoboralfs, loamy-skeletal, mixed, are in moist draws. These soils have mottled subsoils and higher timber productivity

than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, loamy-skeletal, mixed, have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark yellowish brown and brown to dark brown extremely gravelly sandy loam and very gravelly sandy loam about 22-inches thick. The lower part of the subsoil is yellowish brown very gravelly clay loam.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and slough on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, firelines, and the material exposed by road construction have moderate hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24C41—Typic Vitrandepts, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 1,800 to 5,500 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low to moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western red cedar, Douglas-fir, and western larch. Pacific yew is a common tall shrub. Common understory plants are queencup beadlily, wild ginger, goldthread, sword hollyfern, and beargrass. Shrubs invade when openings are made in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on broad ridges and lower side slopes and western red cedar/wild ginger on lower slopes and northerly aspects. Grand fir/queencup beadlily is included on steep southerly aspects and at ridge points. Grand fir/wild ginger is included on lower slopes and northerly aspects. These habitat types are in about 85 percent of this map unit.

Highly dissimilar habitat types are in about 15 percent of this map unit. Grand fir/arrowleaf groundsel, western red cedar/maidenhair fern, and western red cedar/ladyfern are in moist draws and on toeslopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. The substrata are sandy.

Map Unit Composition

Typic Vitrandepts, medial over loamy, mixed, frigid, have loess surface layers 14- to 20-inches thick, do

not have subsoil clay accumulations, and have 0 to 35 subsoil rock fragments. The similar soils are Andic Dystrochrepts, coarse-loamy, mixed, frigid; Eutric Glossoboralfs, coarse-loamy, mixed; or Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid. They have loess surface layers 10- to 14-inches thick, subsoil clay accumulations, or 35 to 60 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, coarse-loamy, mixed, frigid, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Typic Vitrandepts, medial over loamy, mixed, frigid, have a gravelly silt loam surface layer. This surface layer is about 15-inches thick. The upper 5 inches are very dark grayish brown, and the lower 10 inches are brown to dark brown. The subsoil is brown to dark brown gravelly coarse sandy loam about 23-inches thick. The substratum to a depth of 60 inches or more is light brownish gray sandy loam and light yellowish brown gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Competition from understory vegetation limits forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24C65—Andic Cryochrepts, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 5,600 to 6,800 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with short reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Douglas-fir, Engelmann spruce, and lodgepole pine. Common understory plants are beargrass, menziesia, blue huckleberry, western rattlesnake plantain, and elk sedge.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/menziesia on northerly aspects and lower side slopes and subalpine fir/beargrass on ridges and southerly aspects. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Subalpine fir/queencup beadlily, grand fir/beargrass, and grand fir/queencup beadlily are at elevations below 5,800 feet. They have higher timber productivity than the major habitat

types. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Frost pockets in draws limits forest regeneration. On southerly aspects, moisture stress may also limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Logging skid trails, line skidding corridors, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24C8B—Entic Cryandepts-Typic Cryandepts complex, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 4,600 to 6,400 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, and Engelmann spruce. Lodgepole pine and Douglas-fir are on upper side slopes. Western red cedar is in the Selway

drainageway. Common understory plants on upper side slopes and ridges are blue huckleberry, Pacific yew, queencup beadlily, wild ginger, and goldthread. Common understory plants in moist draws and depressions are Sitka alder, mountain maple, mountain red elderberry, western coneflower, and arrowleaf groundsel.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major habitat types on upper side slopes and ridges are grand fir/queencup beadlily above 5,000-feet elevation and grand fir/wild ginger below 5,000-feet elevation. Western red cedar/wild ginger and western red cedar queencup beadlily are included in the Selway River drainageway. These habitat types are in about 80 percent of the forest stand.

The major community types in moist draws and depressions contain alder and forbs. These community types are in about 30 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick and sandy lower soil layers. Soil properties vary with topographic position. Soils on upper side slopes and ridges have light-colored surface layers or thin dark-colored surface layers. Soils in moist draws and depressions have thick dark-colored surface layers and are wet in the spring.

Map Unit Composition

Entic Cryandepts, medial over loamy, mixed, are on upper side slopes and ridges. These soils have loess surface layers 14- to 20-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, coarse-loamy, mixed, or Entic Cryandepts, medial over loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or 35 to 60 percent rock fragments. These soils are in about 50 percent of this map unit.

Typic Cryandepts, medial over loamy, mixed, are in moist draws and depressions. These soils have loess surface layers 14- to 20-inches thick. The similar soils are Andic Cryumbrepts, coarse-loamy, mixed. They have loess surface layers 10- to 14-inches thick. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, loamy-skeletal, mixed, are at ridge points and on steep southerly aspects. These soils have loess surface layers mixed with subsoil material, 35 to 60 percent subsoil rock fragments, and lower timber productivity than the dominant soils. Andic Cryaquepts, coarse-loamy, mixed, are in wet depressions. These soils have mottled or gleyed subsoils and fluctuating water tables.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Entic Cryandepts, medial over loamy, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 18-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown gravelly loamy sand.

Typic Cryandepts, medial over loamy, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown cobbly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown gravelly loamy sand and cobbly loamy sand.

Management

Timber

Sampled forest stands have an annual production of 43±7 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings. Competition from understory vegetation limits forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist

draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and depressions rut and erode when wet. Material exposed by road construction on upper side slopes and ridges tends to erode and ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production on upper side slopes and ridges ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on ridges and upper side slopes. The material exposed by road construction has severe hazards of erosion on ridges and upper side slopes. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be source of sediment.

Riparian Areas

Moist draws and included wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

24CH5—Andic Cryochrepts, high relief rolling uplands, warm

This map unit is on high relief rolling uplands. Elevation ranges from 4,600 to 6,600 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, lodgepole pine, western larch, and Engelmann spruce. Subalpine fir is above 5,800-feet elevation. Common understory plants are beargrass, blue huckleberry, goldthread, queencup beadlily, prince's pine, western meadowrue, northern twinflower, Piper's anemone, and snowberry.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower slopes and grand fir/beargrass on ridges and southerly aspects. A similar habitat type is grand fir/wild ginger. Subalpine fir/beargrass and subalpine fir/menziesia are included in places. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have thin subsoils and 35 to 60 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Andic Cryochrepts, sandy, mixed. They have thicker subsoils or 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on ridges and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface

layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

24CH6—Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands

This map unit is on high relief rolling uplands. Elevation ranges from 4,600 to 6,000 feet. Vegetation consists of cold mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from granitic rocks. The lower soil layers in moist draws formed in stratified alluvial deposits and material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low to moderate. Sediment storage capacity is high. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, Engelmann spruce, and lodgepole pine. Douglas-fir and western larch are on ridges and upper side slopes. Common understory plants on side slopes and ridges are beargrass, blue huckleberry, menziesia, grouse whortleberry, prince's pine, darkwoods violet, western meadowrue, and goldthread. Common understory plants in moist draws and wet depressions are Labrador tea, western bog blueberry, rushes, sedges, Sitka alder, Jeffrey shooting star, bluejoint reedgrass, stream boykinia, claspleaf twisted stalk, and Carolina bugbane.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on northerly aspects and lower slopes. A similar habitat type is

grand fir/wild ginger. Subalpine fir/menziesia is included in places. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained. Soils in moist draws and depressions have fluctuating water tables, which usually rise to or above the surface in the spring.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thicker subsoils. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers 0- to 7-inches thick and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year on ridges and side slopes and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Rutting and puddling of the soil may reduce soil productivity. Steepness of slope limits tractor operation on side slopes and ridges. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration on side slopes and ridges. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Frost pockets in moist draws and wet depressions limit revegetation. Fluctuating water tables are common in moist draws and may limit regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Roads require suitable subgrade material across moist draws and wet depressions because of wet soils. In moist draws and depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and depressions rut and erode when wet. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Steep

slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on side slopes and ridges. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

24CHQ—Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands, weathered granitic substratum

This map unit is on high relief rolling uplands. Elevation ranges from 4,400 to 6,100 feet. Vegetation consists of cold mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from moderately well-weathered granitic rocks. The lower soil layers in moist draws and wet depressions formed in alluvial deposits and material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low. Moderately well-weathered bedrock limits the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, lodgepole pine, and Engelmann spruce. Western larch and Douglas-fir are on ridges and side slopes. Common understory plants are beargrass, goldthread, blue huckleberry, menziesia, northern twinflower, prince's pine, and queencup beadlily. Common understory plants in moist draws and wet depressions are sedges, ladyfern, Sitka alder, tall mannagrass, and panicle bluebells.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on northerly aspects and lower slopes. Subalpine fir/menziesia and subalpine fir/beargrass are included in places. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Sedge meadows are in wet depressions.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained and have moderately well-weathered bedrock below 40 inches. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring and are deep.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, are on side slopes and ridges. They have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 9-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown gravelly sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On side slopes and ridges on southerly aspects, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Frost pockets in moist draws limit forest regeneration. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and wet depressions rut and erode when wet. On side slopes and ridges, moderately well-weathered bedrock is exposed by road construction. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on side slopes and ridges. On side slopes and ridges, the material exposed by road construction has very severe hazards of erosion. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

24CHX—Andic Cryochrepts, high relief rolling uplands, weathered granitic substratum

This map unit is on high relief rolling uplands. Elevation ranges from 5,200 to 6,500 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from moderately well-weathered granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. High relief rolling uplands have rounded ridges, straight to convex side slopes, and concave to V-shaped draw bottoms.

The drainage pattern is dendritic and consists of a dense pattern of first- and second-order drainageways with short reaches. The channel gradients are low to moderate. Moderately well-weathered bedrock limits the regolith water storage capacity, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of lodgepole pine, Engelmann spruce, Douglas-fir, western larch, and grand fir or subalpine fir. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, and prince's pine.

Habitat Type Composition and Distribution

The major habitat type is grand fir/beargrass. Subalpine fir/beargrass is included in places. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Moderately well-weathered bedrock below 40 inches restricts root and water penetration.

Map Unit Composition

Andic Cryochrepts, sandy, mixed, have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over sandy, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy, mixed, are at ridge points and on steep southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy, mixed, have a dark brown sandy loam surface layer. This surface layer is about 9-inches thick. The subsoil is yellowish brown sandy loam about 5-inches thick. The upper substratum is pale brown gravelly sand about 22-inches thick. The lower substratum to a depth of 60 inches or more is moderately well-weathered bedrock.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Moderately well-weathered bedrock is exposed by road construction. Revegetation is difficult because this material is droughty, infertile, and erodible and tends to ravel.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion. The material exposed by road construction has very severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

27A2J—Lithic Ultic Argixerolls-Ultic Argixerolls complex, plateaus

This map unit is on plateaus. Elevation ranges from 4,000 to 5,900 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from fractured basalt and andesite.

Landform

Dominant slope gradients are 10 to 25 percent. Plateaus have nearly flat ridges, convex side slopes, and broadly concave draw bottoms.

The drainage system is very poorly developed with few, first-order drainageways with very short reaches. The channel gradients are low. Sediment storage capacity is high. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of open stands of ponderosa pine. Common understory species are Idaho fescue, bluebunch wheatgrass, Japanese brome, cheatgrass, arrowleaf balsamroot, common yarrow, lupine, and snowberry.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/Idaho fescue on southerly aspects and ridges and ponderosa pine/snowberry on northerly aspects. A similar habitat type is ponderosa pine/mallow ninebark. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Douglas-fir/mallow ninebark, Douglas-fir/snowberry, and grand fir/mallow ninebark are in draws and on lower slopes on northerly aspects. These habitat types have higher timber productivity than the major habitat types.

Characteristics of the Soils

The major soils have dark-colored surface layers and subsoil clay accumulations. Soil properties vary with topography. Soils on ridges, southerly aspects, and upper slopes on northerly aspects have bedrock within 4 to 20 inches of the surface. Soils in draws and on lower slopes on northerly aspects have bedrock within 20 to 60 inches, and substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are on ridges, southerly aspects, and upper slopes on northerly aspects. These soils are in about 70 percent of this map unit.

Ultic Argixerolls, loamy-skeletal, mixed, frigid, are in draws and on lower slopes on northerly aspects. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a very dark brown gravelly silty clay loam surface layer. This surface layer is about 9-inches thick. The subsoil is dark brown very cobbly silty clay loam about 3-inches thick. Fractured bedrock is at about 12 inches.

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 34±6 cubic feet per acre per year. Moisture stress may limit forest regeneration. During site preparation, stones and cobbles may be mixed with the soil in the surface layer. These stones and cobbles can affect planting.

Roads

Hard rock frequently limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 300 pounds per acre per year of air-dry forage under a forest canopy to 500 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

27A3F—Ultic Argixerolls, plateaus

This map unit is on plateaus. Elevation ranges from 3,300 to 5,100 feet. Vegetation consists of dry mixed coniferous forest. The lower soil layers formed in material derived from basalt.

Landform

The dominant slopes have gradients of 10 to 25 percent. Plateaus have nearly flat ridges, convex side slopes, and broadly concave draw bottoms.

The drainage system is very poorly developed with few first-order drainageways with short reaches. The channel gradients are low. Sediment storage capacity is high. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of Douglas-fir and ponderosa pine. Grand fir is on northerly aspects. Common understory plants are mallow ninebark, snowberry, creambush oceanspray, bracted strawberry, and baldhip rose.

Habitat Type Composition and Distribution

The major habitat type is Douglas-fir/mallow ninebark. Similar habitat types are grand fir/white spiraea and grand fir/mallow ninebark. Grand fir/beargrass is included on northerly aspects. These habitat types are in about 95 percent of this map unit.

A highly dissimilar habitat type is in 5 percent of this map unit. Grand fir/queencup beadlily is in moist draws. This habitat type has higher timber productivity than the major habitat type.

Characteristics of the Soils

The major soils have dark-colored surface layers. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have subsoil clay accumulations and 35 to 60 percent subsoil rock fragments. The similar soils are Ultic Haploxerolls, loamy-skeletal, mixed, frigid, or Ultic Argixerolls, fine-loamy, mixed, frigid. They do not have subsoil clay accumulations or have 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Eutric Glossoboralfs, loamy-skeletal, mixed, are on northerly aspects above about 4,800-feet elevation. These soils have thin dark-colored surface layers and higher timber productivity than the dominant soils. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are at ridge points. These soils have fractured bedrock within 4 to 20 inches of the surface and lower timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Moisture stress may limit forest regeneration. Competition from understory vegetation also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C1E—Ultic Argixerolls, dissected mountain slopes, dry

This map unit is on dissected mountain slopes. Elevation ranges from 1,900 to 5,300 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from basalt, andesite, and slate.

Landform

The dominant slopes are on southerly aspects with gradients of 30 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that begin about halfway up the slope. The channel gradients are moderate. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of bluebunch wheatgrass, cheatgrass, Japanese brome, Sandberg bluegrass, Idaho fescue, common yarrow, arrowleaf balsamroot, and lupine.

Habitat Type Composition and Distribution

Plant communities are comparable to Idaho fescue/bluebunch wheatgrass habitat type near draws and at elevations above 3,000 feet and bluebunch wheatgrass/Sandberg bluegrass habitat type on ridges and below 3,000-feet elevation. These community types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Ponderosa pine/snowberry, ponderosa pine/Idaho fescue, and ponderosa pine/bluebunch wheatgrass are in draws.

Characteristics of the Soils

The major soils have dark-colored surface layers. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have surface layers 10- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are at ridge points. These soils have bedrock within 4 to 20 inches of the surface and lower timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

The potential native plant community produces about 900 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C24—Ultic Haploxerolls, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 2,800 to 5,800 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 25 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate at about halfway up the slope. The channel gradients are moderate. The regolith water storage capacity is limited by bedrock at about 26 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some occurrence of Douglas-fir. Common understory plants are bluebunch wheatgrass, Idaho fescue, common yarrow, Saskatoon serviceberry, pinegrass, snowberry, and mallow ninebark.

Habitat Type Composition and Distribution

The major habitat type is ponderosa pine/snowberry. A similar habitat type is ponderosa pine/Idaho fescue. Douglas-fir/ninebark, Douglas-fir/elk sedge, and Douglas-fir/pinegrass are included. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/queencup beadlily is in draws above 4,000-feet elevation. This habitat type has higher timber productivity than the major habitat type.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 20 to 60 inches of the surface.

Map Unit Composition

Ultic Haploxerolls are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Xerochrepts are at ridge points and on steep southerly aspects. These soils have light-colored surface layers or thin, dark-colored surface layers and lower timber productivity than the dominant soils.

Representative Profile

Ultic Haploxerolls have a very dark brown sandy loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown. The upper 6 inches are sandy loam, and the lower 8 inches are very cobbly loamy sand. The substratum is moderately well-weathered slowly permeable granitic rock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 34±6 cubic feet per acre per year. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 700 pounds per acre per year of air-dry forage under a forest canopy to 800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C2E—Ultic Argixerolls, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 2,300 to 5,000 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes are on southerly aspects with gradients of 30 to 50 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is sometimes adjacent to larger-order streams, and stream order jumping may occur. The channel gradients are moderate. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some Douglas-fir. Common understory plants are Idaho fescue, lupine, common yarrow, arrowleaf balsamroot, snowberry, mallow ninebark, mountain brome, and rattlesnake brome.

Habitat Type Composition and Distribution

The major habitat type is ponderosa pine/snowberry. Douglas-fir/snowberry and Douglas-fir/mallow ninebark are included above 4,000-feet elevation. These habitat types are in about 90 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Grassland plant communities are at ridge points.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 10- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are at ridge points. These soils have bedrock within 4 to 20 inches of the surface and lower timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 34±6 cubic feet per acre per year. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads rut and erode and are slippery when wet. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 700 pounds per acre per year of air-dry forage under a forest canopy to 800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C38—Andic Dystrochrepts-Typic Dystrochrepts complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 1,800 to 6,200 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. Seeps and springs are common on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are in frost pockets and above about 4,500-feet elevation. Common understory plants are blue huckleberry, beargrass, goldthread, queencup beadlily, American trailplant, snowberry, heartleaf arnica, Piper's anemone, redstem ceanothus, and Saskatoon serviceberry.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower slopes and grand fir/beargrass on ridges and southerly aspects. Similar habitat types are grand fir/wild ginger and grand fir/twinflower. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Douglas-fir/mallow ninebark and grand fir/mallow ninebark are on ridges and steep southerly aspects. Douglas-fir/dwarf huckleberry is in frost pockets. These habitat types have lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with aspect and slope position. Soils on northerly aspects and lower slopes have volcanic ash-influenced loess surface layers 7- to 14-inches thick. Soils on southerly aspects and upper slopes have loess surface layers mixed with subsoil material.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, are on northerly aspects and lower slopes. These soils have 0 to 35 percent subsoil rock fragments and do not have subsoil clay accumulations. The similar soils are Andic Dystrochrepts, loamy-skeletal, mixed, frigid, or Eutric Glossoboralfs, coarse-loamy, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or subsoil clay accumulations. These soils are in about 40 percent of this map unit.

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects and upper slopes. These soils have 0 to 35 percent subsoil rock fragments and moderately coarse-textured substrata. The similar soils are Typic Dystrochrepts, loamy-skeletal, mixed, frigid, or Typic Dystrochrepts, sandy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or coarse-textured substrata. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 30 percent of this map unit. Typic Xerumbrepts, loamy-skeletal, mixed, frigid, are on ridges and steep southerly aspects. These soils have dark-colored surface layers and lower timber productivity than the dominant soils. Typic Vitrandepts, medial over loamy, mixed, frigid, are near draws. These soils have loess surface layers 14- to 18-inches thick and higher timber productivity than the dominant soils. Andic Haplumbrepts, coarse-loamy, mixed, frigid, are in moist draws. These soils have dark-colored loess surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown sandy loam about 30-inches thick. The substratum to a depth of 60 inches or more is yellowish brown very gravelly sand.

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are sandy loam. The substratum to a depth of 60 inches or more is brown to dark brown very gravelly sand.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is, sandy, infertile and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion on northerly aspects and moderate hazards of erosion on southerly aspects. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C3C—Eutric Glossoboralfs, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 3,700 to 5,000 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from metasedimentary rocks and Tertiary sediments.

Landform

The dominant slopes have gradients of 25 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is sometimes adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare. Slowly permeable subsoils perch water that appears in seeps and springs on lower slopes.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, ponderosa pine, western larch, and western red cedar. Lodgepole pine and Engelmann spruce are in frost pockets and above about 4,000-feet elevation. Common understory plants are beargrass, northern twinflower, American trailplant, creambush oceanspray, Piper's anemone, goldthread, queencup beadlily, and Saskatoon serviceberry.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower slopes and grand fir/beargrass on ridges, upper side slopes, and southerly aspects. Similar habitat types are grand fir/wild ginger and grand fir/twinflower. Western red cedar/queencup beadlily is included in a few delineations in the Selway River drainageway. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Western red cedar/ladyfern is in a few delineations in the Selway drainageway. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 20-inches thick and subsoil clay accumulations. The lower soil layers are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Eutric Glossoboralfs, loamy-skeletal, mixed, do not have hard, brittle subsoils and have 35 to 60 percent subsoil rock fragments. The similar soils are Typic

Fragiboralfs, loamy-skeletal, mixed, or Eutric Glossoboralfs, fine-loamy, mixed. They have hard, brittle subsoils or 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Dystrochrepts, coarse-loamy, mixed, frigid, are associated with material derived from granitic rocks. These soils do not have slowly permeable subsoils that perch water. Aquic Glossoboralfs, loamy-skeletal, mixed, are in moist draws. These soils have mottled subsoils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, loamy-skeletal, mixed, have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark yellowish brown and brown to dark brown extremely gravelly sandy loam and very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown very gravelly sandy clay loam.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and slough on steep cutbanks. Revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, firelines, and the material exposed by road construction have moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C3F—Ultic Argixerolls, dissected mountain slopes, moist

This map unit is on dissected mountain slopes. Elevation ranges from 3,100 to 5,400 feet. Vegetation consists of dry mixed coniferous forest. The soils formed in material derived from basalt and andesite.

Landform

The dominant slopes are on northerly aspects with gradients of 25 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of Douglas-fir and ponderosa pine. Western larch, grand fir, and Engelmann spruce are above about 4,500-feet elevation on northern and eastern aspects. Common understory plants are mallow ninebark, snowberry, elk sedge, pinegrass, Saskatoon serviceberry, white spiraea, creambush oceanspray, baldhip rose, common yarrow, and bracted strawberry.

Habitat Type Composition and Distribution

The major habitat type is Douglas-fir/mallow ninebark on ridges and southerly aspects above 4,000-feet elevation and northerly aspects below 4,000-feet elevation. Grand fir/mallow ninebark is the major habitat type on northerly aspects above 4,000-feet elevation. A similar habitat type is Douglas-fir/snowberry. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/twinflower and grand fir/blue huckleberry are on northerly aspects

above 5,000-feet elevation. These habitat types have higher timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material and subsoil clay accumulations. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick, subsoil clay accumulations, and 35 to 60 percent subsoil rock fragments. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid; Ultic Haploxerolls, loamy-skeletal, mixed, frigid; or Ultic Argixerolls, fine-loamy, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick and do not have subsoil clay accumulations or have 0 to 35 percent subsoil rock fragments. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Eutric Glossoboralfs, loamy-skeletal, mixed, are associated with grand fir habitat types. These soils have light-colored loess surface layers and higher timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly silty clay loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress and competition from understory vegetation limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C3R—Eutric Glossoboralfs, dissected mountain slopes, basalt substratum

This map unit is on dissected mountain slopes. Elevation ranges from 3,800 to 6,300 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from basalt.

Landform

The dominant slopes have gradients of 25 to 50 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The channel gradients are moderate. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, ponderosa pine, and western red cedar. Lodgepole pine and Engelmann spruce are in frost pockets and above about 4,500-feet

elevation. Common understory plants are blue huckleberry, beargrass, goldthread, starry false Solomon's seal, Piper's anemone, creambush oceanspray, and mountain maple.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges, upper side slopes, and southerly aspects and grand fir/queencup beadlily on northerly aspects and lower slopes. A similar habitat type is grand fir/wild ginger. Western red cedar/queencup beadlily is included in a few delineations in the Selway River drainageway. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Douglas-fir/mallow ninebark is on ridges and southerly aspects. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 4- to 14-inches thick and subsoil clay accumulations. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Eutric Glossoboralfs, loamy-skeletal, mixed, have 35 to 60 percent subsoil rock fragments. The similar soils are Eutric Glossoboralfs, fine-loamy, mixed. They have 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, loamy-skeletal, mixed, frigid, are at ridge points. These soils do not have subsoil clay accumulations and have lower timber productivity than the dominant soils. Aquic Glossoboralfs, loamy-skeletal, mixed, are in moist draws. These soils have mottled subsoils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, loamy-skeletal, mixed, have a brown to dark brown silt loam surface layer. This surface layer is about 9-inches thick. The subsoil is brown to dark brown extremely gravelly silty clay loam about 21-inches thick. The substratum is dark yellowish brown extremely cobbly silty clay loam overlying fractured basalt at about 40 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. On southerly aspects, material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C41—Andic Dystrochrepts, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 1,700 to 4,800 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Dissected mountain slopes have narrow

ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare. Seeps and springs are common on lower slopes.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western red cedar, Douglas-fir, and western larch. Water birch is near draws. Pacific yew is a common tall shrub. Common understory plants are queencup beadlily, goldthread, wild ginger, thimbleberry, starry false Solomon's seal, Piper's anemone, beargrass, snowberry, northern twinflower, and American trailplant. Shrubs invade when openings are made in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on northerly aspects and mid to lower slopes on southerly aspects and western red cedar/wild ginger in depressions. Grand fir/queencup beadlily is included on ridges and southerly aspects. Grand fir/wild ginger is included in places. These habitat types are in about 85 percent of this map unit.

Highly dissimilar habitat types are in about 15 percent of this map unit. Grand fir/arrowleaf groundsel, western red cedar/ladyfern, and western red cedar/maidenhair fern are in moist draws and on lower slopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick and sandy substrata.

Map Unit Composition

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have loess surface layers 10- to 14-inches thick, 0 to 35 percent subsoil rock fragments, and do not have subsoil clay accumulations. The similar soils are Typic Vitrandepts, medial over loamy, mixed, frigid; Andic Dystrochrepts, loamy-skeletal, mixed, frigid; or Eutric Glossoboralfs, coarse-loamy, mixed. They have loess surface layers 14- to 20-inches thick, 35 to 60 percent subsoil rock fragments, or subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Dystrochrepts, coarse-loamy, mixed, frigid, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown sandy loam about 30-inches thick. The substratum to a depth of 60 inches or more is brown very gravelly loamy sand.

Management

Timber

Sampled stands have an annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Competition from understory vegetation limits forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C65—Andic Cryochrepts, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 5,800 to 7,200 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 30 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. The regolith water storage capacity is limited by bedrock at about 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, pinegrass, elk sedge, and menziesia.

Habit Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir habitat types are above about 7,000-feet elevation. These habitat types have lower timber productivity than the major habitat types. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. These habitat types have higher timber productivity than the major habitat types. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick. The substrata are sandy. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have thicker subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum is brownish yellow and yellow very gravelly loamy coarse sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may

cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31C8B—Entic Cryandepts-Typic Cryandepts complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 4,500 to 6,600 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings dominated by shrubs and forbs. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on northerly aspects with gradients of 25 to 45 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is sometimes adjacent to larger-order streams, and stream order jumping may occur. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare. Seeps and springs are common on lower slopes.

Vegetation

Typical vegetation in forest stands consists of grand fir, subalpine fir, Engelmann spruce, and western red cedar. Lodgepole pine and Douglas-fir are on upper side slopes. Common understory plants are blue huckleberry, menziesia, Pacific yew, queencup beadlily, goldthread, and heartleaf arnica. Common understory plants in forest openings are Sitka alder, mountain maple, menziesia, willow, mountain elderberry, blue huckleberry, western coneflower, brackenfern, wild ginger, queencup beadlily, baneberry, and arrowleaf groundsel.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major forest habitat type is grand fir/queencup beadlily. Grand fir/wild ginger below 5,800-feet elevation and subalpine fir/menziesia above 5,800-feet elevation are included. Western red cedar/wild ginger and western red cedar/queencup beadlily are also included in the Selway River drainageway. These habitat types are in about 90 percent of forest stands.

About 30 percent of this map unit is forest openings containing alder and forbs. They are in moist draws, depressions, and lower slopes.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. The lower soil layers are loamy and contain 0 to 60 percent rock fragments. Soil properties vary with vegetation and topographic position. Soils under forest stands on ridges and upper side slopes have thin dark-colored surface layers. Soils in forest openings in moist draws and lower slopes have thick dark-colored surface layers and are wet in the spring.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, are under forest stands on ridges and upper side slopes. These soils have loess surface layers 14- to 20-inches thick and 35 to 60 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, sandy-skeletal, mixed, or Entic Cryandepts, medial over loamy, mixed. They have loess surface layers 10- to 14-inches thick or 0 to 35 percent subsoil rock fragments. These soils are in about 50 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in forest openings in moist draws and on lower slopes. These soils have loess surface layers 14- to 20-inches thick. The similar soils are Andic Cryumbrepts, loamy-skeletal, mixed, or Typic Cryumbrepts, loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or loess surface layers mixed with subsoil material. These soils are in about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Andic Cryaquepts, loamy-skeletal, mixed, are in wet depressions. These soils have mottled or

gleyed subsoils. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly sandy loam.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark brown to brown very gravelly sandy loam.

Management

Timber

Sampled stands have an annual production of 43±7 cubic feet per acre per year in forest stands. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings. Competition from understory vegetation limits forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and wet depressions rut and erode when wet. Material exposed by road construction on ridges and upper side slopes tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production on upper side slopes and ridges ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems. Grazing of moist draws should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Line skidding corridors, logging skid trails, and firelines have slight hazards of erosion on ridges and upper side slopes. The material exposed by road construction has moderate hazards of erosion on ridges and upper side slopes. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of Roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

31CH5—Andic Cryochrepts, dissected mountain slopes, warm

This map unit is on dissected mountain slopes. Elevation ranges from 4,600 to 6,800 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The

channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, western larch, lodgepole pine, subalpine fir, and Douglas-fir. Common understory plants are goldthread, beargrass, blue huckleberry, menziesia, queencup beadlily, and northern twinflower.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and lower slopes and grand fir/beargrass on ridges and southerly aspects. Subalpine fir/menziesia is included near draws and on northerly aspects above 5,800-feet elevation. Subalpine fir/beargrass is included on southerly aspects above 6,000-feet elevation. Grand fir/wild ginger is also included in places. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 20-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, loamy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and 35 to 60 percent subsoil rock fragments. The similar soils are Entic Cryandepts, medial over loamy-skeletal, mixed, or Andic Cryochrepts, coarse-loamy, mixed. They have loess surface layers 14- to 20-inches thick or 0 to 35 percent subsoil rock fragments. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, loamy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Typic Cryandepts, medial over loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown silt loam surface layer. This surface layer is about 13-inches thick. The subsoil is yellowish brown fine sandy loam about 16-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D14—Ultic Haploxerolls, dissected mountain slopes, dry

This map unit is on dissected mountain slopes. Elevation ranges from 1,900 to 6,000 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 30 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is sometimes adjacent to larger-order streams, and stream order jumping may occur. The channel gradients are moderate. The regolith water storage capacity is limited by bedrock at about 26 inches, and runoff may occur.

Vegetation

Typical vegetation consists of bluebunch wheatgrass, cheatgrass, Japanese brome, Sandberg bluegrass, Idaho fescue, common yarrow, arrowleaf balsamroot, and lupine.

Habitat Type Composition and Distribution

Plant communities are comparable to Idaho fescue/bluebunch wheatgrass habitat types near draws and at elevations above 3,000 feet and bluebunch wheatgrass/Sandberg bluegrass habitat types on ridges and below 3,000-feet elevation. These community types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Ponderosa pine/Idaho fescue is near draws. Shrub/forb plant communities are in draws.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 20 to 60 inches of the surface.

Map Unit Composition

Ultic Haploxerolls have dark-colored surface layers 7- to 20-inches thick. The similar soils are Pachic Ultic Haploxerolls. They have dark-colored surface layers 20- to 30-inches thick. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Dystric Xerochrepts, sandy, mixed, frigid, are at ridge points. These soils have thin dark-colored surface layers and lower timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Ultic Haploxerolls have a very dark brown sandy loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown. The upper 6 inches are sandy loam, and the lower 8 inches are very cobbly loamy sand. The substratum is moderately well-weathered slowly permeable granitic rock at about 40 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to Timber management.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

The potential native plant community produces about 700 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D1E—Ultic Argixerolls, steep dissected mountain slopes, dry

This map unit is on steep dissected mountain slopes. Elevation ranges from 2,200 to 6,800 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes are on southerly aspects with gradients of 45 to 60 percent. Dissected mountain

slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The channel gradients are high. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of cheatgrass, rattlesnake brome, prairie junegrass, Idaho fescue, common yarrow, and Indian paintbrush.

Habitat Type Composition and Distribution

Plant communities are comparable to Idaho fescue/bluebunch wheatgrass habitat types above 4,000-feet elevation and near draws and in depressions and to bluebunch wheatgrass/Sandberg bluegrass habitat types on side slopes and ridges. These community types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Ponderosa pine/snowberry and ponderosa pine/ninebark are in draws, and ponderosa pine/bluebunch wheatgrass is on ridges above about 4,000-feet elevation.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain more than 60 percent rock fragments. Bedrock is within 20 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick, subsoil clay accumulations, and 0 to 35 percent subsoil rock fragments. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are at ridge points. These soils have bedrock within 4 to 20 inches of the surface and lower timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

The potential native plant community produces about 800 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D24—Ultic Haploxerolls, steep dissected mountain slopes

This map unit is on steep dissected mountain slopes. Elevation ranges from 2,600 to 6,500 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. This map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are high. The regolith water storage capacity is limited by bedrock at about 26 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some Douglas-fir. Common understory plants are bluebunch wheatgrass, common yarrow, Idaho fescue, snowberry, elk sedge, pinegrass, white spiraea, and Woods' rose.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/bluebunch wheatgrass on ridges and side slopes, ponderosa pine/Idaho fescue near draws below about 4,000-feet elevation, and Douglas-fir/Idaho fescue at ridge points. Douglas-fir/mallow ninebark is included on side slopes and in draws above about 4,000-feet elevation. Douglas-fir/snowberry is included in places. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grassland plant communities are at ridge points and on steep southern aspects below about 4,000-feet elevation.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 20 to 60 inches of the surface.

Map Unit Composition

Ultic Haploxerolls are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Dystric Xerochrepts, sandy-skeletal, mixed, frigid, are on convex upper side slopes. These soils have light-colored surface layers and lower timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Ultic Haploxerolls have a very dark brown sandy loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown. The upper 6 inches are sandy loam, and the lower 8 inches are very cobbly loamy sand. The substratum is moderately well-weathered slowly permeable granitic rock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 34±6 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 700 pounds per acre per year of air-dry forage under a forest canopy to 800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D38—Typic Dystrochrepts-Andic Dystrochrepts complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 1,900 to 6,600 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are high. Seeps and springs are common on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are in frost pockets above about 4,500-feet elevation. Common understory plants are beargrass, snowberry, blue huckleberry, goldthread, mountain maple, and northern twinflower.

Habitat Type Composition and Distribution

The major habitat types are grand fir/queencup beadlily on northerly aspects and grand fir/beargrass on southerly aspects. Included habitat types are grand fir/twinflower and grand fir/wild ginger. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 30 percent of this map unit. Douglas-fir/mallow ninebark is on ridges and steep southerly aspects. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Substrata are loamy and contain 0 to 50 percent rock fragments. Soil properties vary with aspect and topography. Soils on southerly aspects and upper slopes have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects and lower slopes have surface layers formed in volcanic ash-influenced loess 7- to 20-inches thick.

Map Unit Composition

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects and upper slopes. These soils have 0 to 35 percent subsoil rock fragments. The similar soils are Typic Dystrochrepts, loamy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments. These soils are in about 40 percent of this map unit.

Andic Dystrochrepts, coarse-loamy, mixed, frigid, are on northerly aspects and lower slopes. These soils have loess surface layers 7- to 14-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Typic Vitrandepts, medial over loamy, mixed, frigid, or Andic Dystrochrepts, loamy-skeletal, mixed, frigid. They have loess surface layers 14- to 18-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 40 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Xerumbrepts, loamy-skeletal, mixed, frigid, are on open dry ridges and steep southerly aspects. These soils have dark-colored surface layers, 35 to 60 percent subsoil rock fragments, and lower timber productivity. Umbric Vitrandepts, medial over coarse-loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The upper part of the subsoil is brown to dark brown loam about 10-inches thick. The lower part of the subsoil is brown to dark brown gravelly sandy loam about 24-inches thick. The substratum to a depth of 60 inches or more is brown to dark brown very gravelly sandy loam.

Andic Dystrochrepts, coarse-loamy, mixed, frigid, have a dark brown silt loam surface layer. This surface layer is about 12-inches thick. The subsoil is brown to dark brown loam about 30-inches thick. The substratum to a depth of 60 inches or more is yellowish brown very gravelly sandy loam.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and slight hazards of erosion on northerly aspects. The material exposed by road construction has moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D3F—Ultic Argixerolls, steep dissected mountain slopes

This map unit is on steep dissected mountain slopes. Elevation ranges from 1,800 to 6,200 feet. Vegetation consists of dry mixed coniferous forest. The lower soil layers formed in material derived from basalt.

Landform

The dominant slopes have gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are high. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of Douglas-fir and ponderosa pine. Western larch, lodgepole pine, and grand fir are at elevations above 4,000 feet. Common understory plants are mallow ninebark, creambush oceanspray, snowberry, white spiraea, mountain maple, Saskatoon serviceberry, rose, pinegrass, elk sedge, Columbia brome, bracted strawberry, and mosses.

Habitat Type Composition and Distribution

The major habitat types are Douglas-fir/mallow ninebark on ridges and southerly aspects above 4,000-feet elevation and on northerly aspects below 4,000-feet elevation and grand fir/mallow ninebark on northerly aspects and lower slopes. Similar habitat types are Douglas-fir/snowberry and grand fir/spiraea. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/beargrass and grand fir/twinflower are above 4,500-feet elevation on northerly aspects. These soils have higher timber productivity than the major habitat types. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 20 to 40 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 8- to 20-inches thick, subsoil clay accumulations, and 35 to 60 percent subsoil rock fragments. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid; Ultic Haploxerolls, loamy-skeletal, mixed, frigid; or Ultic Argixerolls, fine-loamy, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick, do not have subsoil clay accumulations, or 0 to 35 percent subsoil rock fragments. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Eutric Glossoboralfs, loamy-skeletal, mixed, are associated with grand fir habitat types. They have light-colored surface layers and higher timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown

gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick.

The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation may limit forest regeneration on southerly aspects. Competition from understory vegetation also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. On southerly aspects, material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 150 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D48—Typic Dystrochrepts-Typic Vitrandepts complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 1,600 to 5,800 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are high. Seeps and springs are common on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, western red cedar, Douglas-fir, and western larch. Engelmann spruce is in frost pockets and above about 4,000-feet elevation. Common understory plants are Pacific yew, queencup beadlily, goldthread, blue huckleberry, wild ginger, mountain maple, northern twinflower, starry false Solomon's seal, Utah honeysuckle, and western thimbleberry. Shrubs invade when openings are made in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on ridges, northerly aspects, and lower side slopes and western red cedar/wild ginger on northerly aspects and in shallow depressions. Grand fir/queencup beadlily and grand fir/beargrass are included on southerly aspects. Grand fir/wild ginger is included in depressions. These habitat types are in about 85 percent of this map unit.

Highly dissimilar habitat types are in about 15 percent of this map unit. Western red cedar/ladyfern, western red cedar/maidenhair fern, and grand fir/arrowleaf groundsel are in moist draws and on toeslopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with aspect. Soils on southerly aspects have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects have surface layers formed in volcanic ash-influenced loess 10- to 20-inches thick.

Map Unit Composition

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects. These soils have 0 to 35 percent subsoil rock fragments. The similar soils

are Typic Dystrochrepts, loamy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments. These soils are in about 45 percent of this map unit.

Typic Vitrandepts, medial over loamy, mixed, frigid, are on northerly aspects. These soils have loess surface layers 14- to 20-inches thick and 0 to 35 percent subsoil rock fragments. The similar soils are Andic Dystrochrepts, coarse loamy, mixed, frigid, or Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid. They have loess surface layers 10- to 14-inches thick or 35 to 60 percent subsoil rock fragments. These soils are in about 45 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws and on toeslopes. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are sandy loam. The substratum to a depth of 60 inches or more is brown to dark brown very gravelly loamy sand.

Typic Vitrandepts, medial over loamy, mixed, frigid, have a gravelly silt loam surface layer. This surface layer is about 15-inches thick. The upper 5 inches are very dark grayish brown, and the lower 10 inches are brown to dark brown. The subsoil is brown to dark brown gravelly coarse sandy loam about 22-inches thick. The substratum to a depth of 60 inches or more is light brownish gray sandy loam and light yellowish brown very gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Competition from understory vegetation limits forest regeneration. Solar insolation on southerly aspects also limits regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and slight hazards of erosion on northerly aspects. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D67—Dystric Cryochrepts, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 5,700 to 7,400 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit may be adjacent to larger-order streams, and stream order jumping may occur. The channel gradients are high. Seeps and springs are common on lower slopes. The regolith water storage capacity is limited by bedrock at about 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of stands of subalpine fir, lodgepole pine, and Engelmann spruce. Douglas-fir is below 6,500-feet elevation. Whitebark pine is above 7,000-feet elevation. Common understory

plants are beargrass, grouse whortleberry, elk sedge, menziesia, and woodrush.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. These habitat types have higher timber productivity than the major habitat types. Fluctuating water tables limit forest regeneration. Whitebark pine/subalpine fir habitat types are above 7,000-feet elevation. They have lower timber productivity than the major habitat types.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, have coarse-textured substrata. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have moderately coarse-textured substrata. These soils are in about 75 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 25 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are on mid to lower slopes and northerly aspects. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop is present throughout.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown and light yellowish brown very gravelly sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D77—Entic Cryumbrepts-Rock outcrop complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 6,200 to 8,100 feet. Vegetation consists of open subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 40 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of first-order drainageways that originate about halfway up the slope. The channel gradients are high.

Seeps and springs are common on lower slopes. The regolith water storage capacity is limited by bedrock at 40 inches or less, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of whitebark pine, subalpine fir, and Engelmann spruce. Lodgepole pine and Douglas-fir are below about 6,800-feet elevation. Common understory plants are beargrass, elk sedge, woodrush, poke knotweed, powder phlox, and yellow eriogonum.

Habitat Type Composition and Distribution

The major habitat type is whitebark pine/subalpine fir. Similar habitat types are subalpine fir/woodrush and subalpine fir/beargrass. Douglas-fir/pinegrass is included in a few delineations below 6,500-feet elevation. These habitat types are in about 60 percent of this map unit.

Highly dissimilar community types are in about 20 percent of this map unit. Grass/forb communities are on ridges and southerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 40 inches of the surface.

Map Unit Composition

Entic Cryumbrepts, sandy-skeletal, mixed, do not have subsoils. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed. They have subsoils. These soils are in about 70 percent of this map unit.

Rock outcrop is throughout and occupies about 20 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in depressions on northerly aspects. These soils have loess surface layers 14- to 18-inches thick and higher timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Entic Cryumbrepts, sandy-skeletal, mixed, have a very dark brown gravelly sandy loam surface layer. This surface layer is about 16-inches thick. The substratum is dark yellowish brown very cobbly sand overlying bedrock at about 39 inches.

Management

Timber

Sampled stands have an annual production of less than 20 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Forest regeneration is limited by a harsh subalpine climate.

Roads

Hard rock frequently limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31D8B—Entic Cryandepts-Typic Cryandepts complex, steep dissected mountain slopes

This map unit is on steep dissected mountain slopes. Elevation ranges from 4,200 to 6,200 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings dominated by shrubs and forbs. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on northerly aspects with gradients of 40 to 60 percent. Steep dissected

mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate about halfway up the slope. The map unit is sometimes adjacent to larger-order streams, and stream order jumping may occur. The channel gradients are high. Seeps and springs are common on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation in forest stands consists of grand fir, subalpine fir, Engelmann spruce, and western red cedar. Lodgepole pine and Douglas-fir are on upper side slopes. Common understory plants are blue huckleberry, menziesia, Pacific yew, queencup beadlily, goldthread, and heartleaf arnica. Common understory plants in forest openings are Sitka alder, mountain maple, menziesia, willow, mountain red elderberry, blue huckleberry, western coneflower, brackenfern, wild ginger, queencup beadlily, arrowleaf groundsel, and baneberry.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major habitat types in forest stands are grand fir/queencup beadlily above 5,000-feet elevation and grand fir/wild ginger on northerly aspects and in depressions. Subalpine fir/menziesia is included at elevations above 5,800 feet. Western red cedar/wild ginger and western red cedar/queencup beadlily are included in the Selway drainageway. These habitat types are in about 90 percent of forest stands.

About 30 percent of this map unit is forest openings dominated by alder and forbs. They are in moist draws, depressions, and on lower slopes.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. Soil properties vary with vegetation and topographic position. Soils under forest stands on ridges and upper slopes have thin dark-colored surface layers and loamy lower soil layers with 0 to 60 percent rock fragments. Soils in forest openings in moist draws and depressions have thick dark-colored surface layers, are wet in the spring, and have sandy lower soil layers.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, are under forest stands on ridges and upper slopes. These soils have loess surface layers 14- to 20-inches thick and 35 to 60 percent subsoil rock fragments. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Entic Cryandepts, medial over loamy, mixed. They have loess surface layers 10- to 14-inches thick or 0 to 35 percent subsoil rock fragments. These soils are in about 60 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in forest openings in moist draws and depressions. These soils have loess surface layers 14- to 20-inches thick. The similar soils are Andic Cryumbrepts, loamy-skeletal, mixed, or Typic Cryumbrepts, loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or loess surface layers mixed with subsoil material. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Andic Cryaquepts, loamy-skeletal, mixed, are in wet depressions and moist draws. These soils have mottled or gleyed subsoils. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly sandy loam.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark brown to brown very gravelly loamy sand.

Management

Timber

Sampled stands have an annual production of 43±7 cubic feet per acre per year in forest stands.

Map unit productivity is reduced by moist forest openings. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Competition from understory vegetation limits forest regeneration. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws, cutbanks tend to slough. Material exposed by road construction on ridges and upper slopes tends to erode and ravel on steep cutbanks.

Range

Forest understory forage production on side slopes ranges from about 150 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 500 pounds per acre per year of air-dry forage.

Watershed

Line skidding corridors and firelines have slight hazards of erosion on ridges and upper slopes. The material exposed by road construction has moderate hazards of erosion on ridges and upper slopes. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

31DH7—Andic Cryochrepts-Dystric Cryochrepts complex, dissected mountain slopes

This map unit is on dissected mountain slopes. Elevation ranges from 4,600 to 6,600 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 60 percent. Dissected mountain slopes have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are high. The regolith water storage capacity is limited by bedrock at about 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, Douglas-fir, western larch, Engelmann spruce, and lodgepole pine. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, prince's pine, menziesia, and queencup beadlily.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on northerly aspects. Similar habitat types are grand fir/wild ginger and subalpine fir/queencup beadlily. Subalpine fir/menziesia is included near draws and above 5,800-feet elevation on northerly aspects. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Subalpine fir/beargrass is on southerly aspects above 6,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with aspect. Soils on northerly aspects have volcanic ash-

influenced loess surface layers 7- to 14-inches thick. Soils on southerly aspects have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on northerly aspects. These soils have thin subsoils and do not have subsoil clay accumulations. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Andeptic Cryoboralfs, loamy-skeletal, mixed. They have thicker subsoils or subsoil clay accumulations. These soils are in about 40 percent of this map unit.

Dystric Cryochrepts, sandy-skeletal, mixed, are on southerly aspects. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thicker subsoils. These soils are in about 40 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Entic Cryandepts, medial over loamy-skeletal, mixed, are on lower slopes and in depressions. These soils have loess surface layers 14- to 18-inches thick, thick subsoils, and higher timber productivity than the dominant soils. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers and higher timber productivity than the dominant soils. Fluctuating water tables limit forest regeneration. Rock outcrop occurs throughout this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum is brownish yellow and yellow very gravelly sand overlying bedrock at about 40 inches.

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown very gravelly sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and slight hazards of erosion on northerly aspects. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

31DHP—Dystric Cryochrepts, dissected mountain slopes, basalt and andesite substrata

This map unit is on dissected mountain slopes. Elevation ranges from 5,100 to 8,000 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes have gradients of 40 to 60 percent. Dissected mountain slopes have narrow

ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a sparse pattern of first-order drainageways that originate about halfway up the slope. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The channel gradients are moderate. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, and Douglas-fir. Stands of subalpine fir and whitebark pine are above about 7,000-feet elevation. Common understory plants are blue huckleberry, western meadowrue, elk sedge, and mosses.

Habitat Type Composition and Distribution

The major habitat types are grand fir/blue huckleberry below 6,200-feet elevation and subalpine fir/blue huckleberry above 6,200 feet. Similar habitat types are grand fir/beargrass and grand fir/twinflower. Subalpine fir/menziesia is included in places. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir habitat types are on ridges above 7,000-feet elevation. They have lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, do not have subsoil clay accumulations. The similar soils are Mollic Cryoboralfs, loamy-skeletal, mixed. They have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Cryochrepts, loamy-skeletal, mixed, are near draws and in depressions. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum is yellowish brown and light yellowish brown extremely gravelly loam overlying fractured bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32A65—Andic Cryochrepts, gently sloping mountain slopes

This map unit is on gently sloping mountain slopes. Elevation ranges from 5,800 to 6,800 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is a weakly developed dendritic pattern of first- and second-order drainageways. The channel gradients are low. Sediment storage capacity is high. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, menziesia, and prince's pine.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. Subalpine fir/queencup beadlily is included in places. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. These habitat types have higher timber productivity than the major habitat types. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 20-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 20-inches thick or thicker subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32A66—Andic Cryochrepts-Cryaquepts complex, mountain slopes

This map unit is on mountain slopes. Elevation ranges from 5,200 to 6,600 feet. Vegetation consists of cold mixed coniferous and wet forest. The lower soil layers on side slopes and ridges formed in material derived from granitic rocks. The lower soil layers in moist draws and wet depressions formed in stratified alluvial deposits and material derived from granitic rocks.

Landform

The dominant slopes are on northerly aspects with gradients of 15 to 35 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation on side slopes and ridges is mixed stands of grand fir, lodgepole pine, subalpine fir, Engelmann spruce, and Douglas-fir. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, grouse whortleberry, queencup beadlily, menziesia, and prince's pine. Common understory plants in moist draws and wet depressions are Sitka alder, sedges, rushes, Jeffrey shootingstar, stream boykinia, monkeyflower, and marsh marigold.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on lower slopes and northerly aspects. Subalpine fir/menziesia is included near draws and above 5,800-feet elevation. These habitat types are in about 70 percent of this map unit.

Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. These habitat types are in about 20 percent of this map unit.

Alder/forb communities and sedge meadows are in wet depressions.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained and have volcanic ash-influenced loess surface layers 7- to 20-inches thick. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring. These soils also have surface layers formed in volcanic ash-influenced loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 20-inches thick or thicker subsoils. These soils are in about 70 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year on ridges and side slopes and 40±33 cubic feet per acre per year in moist draws. On side slopes and ridges site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by

mixing loess surface layers with subsoil material. On side slopes and ridges, On southerly aspects, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. In moist draws and wet depressions, frost pockets limit forest regeneration. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and wet depressions rut and erode when wet. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines on side slopes and ridges have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

32A8B—Entic Cryandepts-Typic Cryandepts complex, gently sloping mountain slopes

This map unit is on gently sloping mountain slopes. Elevation ranges from 4,800 to 6,400 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings dominated by shrubs and forbs. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is dendritic and consists of first-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation in forest stands is grand fir, subalpine fir, Engelmann spruce, and western red cedar. Lodgepole pine and Douglas-fir are on upper side slopes. Common understory plants are beargrass, blue huckleberry, menziesia, queencup beadlily, and goldthread. Common plants in forest openings are Sitka alder, mountain maple, mountain red elderberry, baneberry, thimbleberry, western coneflower, arrowleaf groundsel, and pioneer violet.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major habitat types are grand fir/wild ginger near draws and in depressions, grand fir/queencup beadlily on upper side slopes, and grand fir/beargrass on ridges. A similar habitat type above 5,800-feet elevation is subalpine fir/queencup beadlily. Subalpine fir/menziesia is included near draws and on northerly aspects above 6,000-feet elevation. Western red cedar/queencup beadlily and western red cedar/wild ginger are included in the Selway drainageway. These habitat types are in about 90 percent of forest stands. The major community

types in draws, depressions, and on lower slopes contain alder and forbs. These community types are in about 30 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick and sandy lower soil layers. Soil properties vary with topographic position. Soils on side slopes and ridges have thin dark-colored surface layers. Soils in draws and depressions have thick dark-colored surface layers.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, are on side slopes and ridges. They have loess surface layers 14- to 20-inches thick and moderately coarse textures. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Entic Cryandepts, medial over sandy or sandy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or coarse textures. These soils are in about 50 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in draws and depressions. These soils have loess surface layers 14- to 20-inches thick. The similar soils are Andic Cryumbrepts, loamy-skeletal, mixed, or Typic Cryumbrepts, loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or loess surface layers mixed with subsoil material. These soils are in about 50 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 16-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly loamy sand.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very gravelly loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year in forest stands. Map unit productivity is reduced by forest openings. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Observations indicate limitations to forest regeneration may be expected adjacent to forest openings. Moisture stress may limit forest regeneration. Competition from understory vegetation also limits forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. The potential native plant community in forest openings produces about 500 pounds per acre per year of air-dry forage.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32AH5—Entic Cryandepts, gently sloping mountain slopes

This map unit is on mountain slopes. Elevation ranges from 4,600 to 6,400 feet. Vegetation consists

of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is a weakly developed dendritic pattern of first- and second-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, lodgepole pine, subalpine fir, western larch, and Douglas-fir. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, prince's pine, grouse whortleberry, Piper's anemone, menziesia, and queencup beadlily.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on lower slopes and northerly aspects. Similar habitat types are grand fir/wild ginger and subalpine fir/queencup beadlily. Subalpine fir/menziesia is included near draws and above 5,800-feet elevation. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick and sandy substrata.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, have loess surface layers 14- to 20-inches thick and thick subsoils. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Entic Cryandepts, medial over sandy or sandy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or thin subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, loamy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Typic Cryandepts, medial over loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown cobbly loam about 16-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly loamy sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32AHP—Mollic Cryoboralfs, gently sloping mountain slopes

This map unit is on gently sloping mountain slopes. Elevation ranges from 4,800 to 6,700 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from andesite, basalt, and limestone.

Landform

The dominant slopes have gradients of 10 to 40 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, Engelmann spruce, western larch, and lodgepole pine. Subalpine fir is above 6,200-feet elevation, and ponderosa pine is below 5,500 feet. Common understory plants are blue huckleberry, northern twinflower, mallow ninebark, Piper's anemone, creambush oceanspray, snowberry, western meadowrue, and goldthread.

Habitat Type Composition and Distribution

The major habitat types are grand fir/blue huckleberry above 5,500-feet elevation and grand fir/twinflower below 5,500 feet. Subalpine fir/blue huckleberry and subalpine fir/beargrass are included above 6,200-feet elevation. Grand fir/mallow ninebark is included below 5,500-feet elevation. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 20 to 60 inches of the surface.

Map Unit Composition

Mollic Cryoboralfs, loamy-skeletal, mixed, have thin dark-colored surface layers and subsoil clay accumulations. The similar soils are Typic Cryumbrepts, loamy-skeletal, mixed, or Dystric Cryochrepts, loamy-skeletal, mixed. They do not have subsoil clay accumulations and have thick dark-colored surface layers or light-colored surface layers. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Entic Cryandepts, medial over loamy-skeletal, mixed, are on northerly aspects above 6,000-feet elevation. They have loess surface layers 14- to 20-inches thick and higher timber productivity than the dominant soils.

Representative Profile

Mollic Cryoboralfs, loamy-skeletal, mixed, have a gravelly silt loam surface layer. This surface layer is about 11-inches thick. The upper 4 inches are very dark grayish brown, and the lower 7 inches are dark brown. The upper part of the subsoil is dark yellowish brown very gravelly silt loam about 16-inches thick. The lower part of the subsoil is yellowish brown extremely gravelly silt loam overlying fractured bedrock at about 36 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Moisture stress may limit forest regeneration.

Roads

Unsurfaced roads are slippery when wet. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32C65—Entic Cryandepts, moderately steep mountain slopes

This map unit is on moderately steep mountain slopes. Elevation ranges from 5,600 to 7,300 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is a weakly developed dendritic pattern of first- and second-order drainageways. The channel gradients are moderate. The regolith water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, and lodgepole pine. Douglas-fir and grand fir are below about 6,500-feet elevation. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, menziesia, goldthread, and elk sedge.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. Subalpine fir/queencup beadlily is included. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick and sandy substrata.

Map Unit Composition

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, have loess surface layers 14- to 20-inches thick and thin subsoils. The similar soils are Andic Cryochrepts, sandy-skeletal, mixed, or Entic Cryandepts, medial over loamy-skeletal. They have loess surface layers 10- to 14-inches thick or thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very gravelly sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Logging skid trails, line skidding corridors, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads

constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32C8B—Entic Cryandepts-Typic Cryandepts complex, mountain slopes

This map unit is on moderately steep mountain slopes. Elevation ranges from 4,800 to 6,600 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings dominated by shrubs and forbs. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is a weakly developed dendritic pattern of first- and second-order drainageways. The channel gradients are moderate. Seeps and springs are common at drainageway heads and on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation in forest stands is grand fir, subalpine fir, Engelmann spruce, and western red cedar. Lodgepole pine and Douglas-fir are on upper side slopes. Common understory plants are blue huckleberry, menziesia, Pacific yew, queencup beadlily, goldthread, and heartleaf arnica. Common understory plants in forest openings are Sitka alder, mountain maple, menziesia, willow, mountain red elderberry, western coneflower, baneberry, and arrowleaf groundsel.

Habitat Type Composition and Distribution

About 70 percent of this map unit is forested. The major habitat types in forest stands are grand fir/queencup beadlily on upper side slopes and grand fir/wild ginger near draws and in depressions. A similar habitat type above 5,800-feet elevation on southerly aspects is subalpine fir/queencup beadlily. Subalpine fir/menziesia is included on northerly aspects. Western red cedar/wild ginger and western red cedar/queencup beadlily are included in the Selway River drainageway. These habitat types are in about 90 percent of forest stands.

The major community types in moist draws, depressions and on lower slopes contain alder and forbs. These community types are in about 30 percent of this map unit. Included in this map unit are up to 10 percent highly dissimilar habitat types. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. The substrata are loamy and contain 0 to 60 percent rock fragments. Soil properties vary with topographic position. Soils on side slopes and ridges have thin dark-colored surface layers and are well drained. Soils in moist draws and wet depressions have thick dark-colored surface layers and fluctuating water tables, which usually rise to or above the surface in the spring.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, are on side slopes and ridges. They have loess surface layers 14- to 20-inches thick and loamy substrata. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Entic Cryandepts, medial over sandy or sandy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or sandy substrata. These soils are in about 60 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in moist draws and wet depressions. These soils have loess surface layers 14- to 20-inches thick. The similar soils are Andic Cryumbrepts, loamy-skeletal, mixed, or Typic Cryumbrepts, loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or loess surface layers mixed with subsoil material. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Andic Cryaquepts, loamy-skeletal, mixed, are in wet depressions. These soils have mottled or gleyed subsoils and fluctuating water tables.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown

cobbly loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly sandy loam.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark brown to brown very cobbly sandy loam.

Management

Timber

Sampled stands have an annual production of 43±7 cubic feet per acre per year in forest stands. Map unit productivity is reduced by moist forest openings. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings. Competition from understory vegetation also limits forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depression. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and wet depressions. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. In moist draws and wet depressions, cutbanks tend to slough. Unsurfaced roads in moist draws and wet depressions rut and erode when wet.

Range

Forest understory forage production on side slopes ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 300 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Line skidding corridors, logging skid trails, and firelines on side slopes and ridges have slight hazards of erosion. The material exposed by road construction has moderate hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

32CH5—Andic Cryochrepts, moderately steep mountain slopes

This map unit is on moderately steep mountain slopes. Elevation ranges from 4,600 to 7,100 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is a weakly developed dendritic pattern of first- and second-order drainageways. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, subalpine fir, lodgepole pine, Douglas-fir, and western larch. Common understory plants are beargrass, blue huckleberry, goldthread, prince's pine, northern twinflower, grouse whortleberry, menziesia, and piper anemone.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on lower slopes and northerly aspects. Subalpine fir/menziesia is included near draws and

on northerly aspects above 5,800-feet elevation; subalpine fir/beargrass is included on southerly aspects above 5,800 feet. Similar habitat types are grand fir/twinflower and subalpine fir/queencup beadlily. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points and on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Andic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, logging skid trails, and firelines have slight hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

32CHP—Dystric Cryochrepts, moderately steep mountain slopes

This map unit is on moderately steep mountain slopes. Elevation ranges from 5,000 to 7,100 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes have gradients of 30 to 45 percent. Mountain slopes have broad ridges, convex side slopes, and weakly V-shaped to concave draw bottoms.

The drainage pattern is dendritic and consists of first- and second-order drainageways. The channel gradients are moderate. The regolith water storage capacity in underlying fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, Douglas-fir, subalpine

fir, and lodgepole pine. Ponderosa pine is below about 5,500-feet elevation. Common understory plants are blue huckleberry, northern twinflower, elk sedge, and Utah honeysuckle.

Habitat Type Composition and Distribution

The major habitat types are grand fir/blue huckleberry above 5,800-feet elevation and grand fir/twinflower below 5,000-feet elevation. A similar habitat type is subalpine fir/blue huckleberry. Subalpine fir/beargrass is included above 6,000-feet elevation. These habitat types are in about 90 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with underlying material. The substrata are loamy and contain more than 60 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, do not have subsoil clay accumulations. The similar soils are Mollic Cryoboralfs, loamy-skeletal, mixed. They have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andeptic Cryoboralfs, loamy-skeletal, mixed, are near draws and in depressions. These soils have loess surface layers 7- to 14-inches thick, subsoil clay accumulations and higher timber productivity than the dominant soils. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum is brown to dark brown extremely cobbly silt loam overlying fractured bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33A65—Andic Cryochrepts, mountain ridges

This map unit is on mountain ridges. Elevation ranges from 5,800 to 7,500 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 5 to 30 percent. Mountain ridges have very broad ridges, convex side slopes, and concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and

second-order drainageways. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Douglas-fir and grand fir are below 6,500-feet elevation. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, menziesia, and goldthread.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. Subalpine fir/queencup beadlily is included. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Subalpine fir/woodrush is on ridges above 6,500-feet elevation. This habitat type has lower timber productivity than the major habitat types. Subalpine fir/bluejoint and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick. The substrata are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Andic Cryochrepts, loamy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thick subsoils. The similar soils are Entic Cryandepts, medial over loamy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thin subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on southerly aspects. These soils have loess surface layers mixed with subsoil material, thin subsoils, and lower timber productivity than the dominant soils. Typic Cryandepts, medial over loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, loamy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly coarse sandy loam.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33A67—Andic Cryochrepts, mountain ridges, cold

This map unit is on mountain ridges. Elevation ranges from 6,000 to 8,100 feet. Vegetation consists of open subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Mountain ridges have very broad ridges, convex side slopes, and concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and second-order drainageways. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of open stands of subalpine fir, lodgepole pine, and whitebark pine. Douglas-fir is included below 6,800-feet elevation. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, pinegrass, and woodrush.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and side slopes below 7,000-feet elevation and whitebark pine/subalpine fir habitat types above 7,000-feet elevation. A similar habitat type on northerly aspects and in depressions is subalpine fir/woodrush. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat and community types are in about 20 percent of this map unit. Grass/forb communities are on steep southerly aspects. Sedge meadow and forb communities are in moist draws and wet depressions. Subalpine fir/bluejoint is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Cryumbrepts, sandy-skeletal, mixed, are in forest openings. These soils have dark-colored surface layers. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws and wet depressions. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow extremely gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of less than 20 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Forest regeneration is limited by a harsh subalpine climate.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33C65—Andic Cryochrepts, moderately steep mountain ridges

This map unit is on mountain ridges. Elevation ranges from 5,800 to 7,500 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 30 to 45 percent. Mountain ridges have very broad ridges, convex side slopes, and broadly concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and second-order drainageways. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Douglas-fir and grand fir are included below 6,500-feet elevation. Whitebark pine is included above 7,000-feet elevation. Common understory plants are beargrass, grouse whortleberry, elk sedge, and blue huckleberry.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on ridges and southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. Subalpine fir/queencup beadlily is included. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir habitat types are on exposed ridges above 7,000-feet elevation. They have lower timber productivity than the major habitat types. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils. Typic Cryandepts, medial over loamy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are brownish yellow gravelly silt loam. The subsoil is yellowish brown very gravelly sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow extremely gravelly coarse sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33C6P—Dystric Cryochrepts, mountain ridges

This map unit is on mountain ridges. Elevation ranges from 5,800 to 8,400 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from andesite.

Landform

The dominant slopes have gradients of 20 to 45 percent. Mountain ridges have very broad ridges, convex side slopes, and concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and second-order drainageways with long reaches. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, and lodgepole pine. Common understory plants are blue huckleberry, beargrass, and Sitka valerian.

Habitat Type Composition and Distribution

The major habitat type is subalpine fir/beargrass. Subalpine fir/blue huckleberry is included at lower elevations. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir is on ridges above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Grass/forb communities are at ridge points.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andeptic Cryoboralfs, loamy-skeletal, mixed, are near draws and in depressions. These soils have subsoil clay accumulations and higher timber productivity than the dominant soils. Typic Cryumbrepts, loamy-skeletal, mixed, are in forest openings. These soils have dark-colored surface layers.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum to a depth of 60 inches or more is brown to dark brown extremely cobbly silt loam.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Moisture stress may limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The

material exposed by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33C77—Typic Cryandepts-Rock outcrop complex, moderately steep mountain ridges

This map unit is on mountain ridges. Elevation ranges from 6,200 to 8,200 feet. Vegetation consists of open subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 20 to 45 percent. Mountain ridges have very broad ridges, convex side slopes, and concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and second-order drainageways. The channel gradients are low. The regolith water storage capacity is high, but runoff occurs when soils are bare of vegetation.

Vegetation

Typical vegetation consists of open stands of subalpine fir, whitebark pine, and lodgepole pine. Common understory plants are beargrass, elk sedge, poke knotweed, powder phlox, yellow eriogonum, Idaho fescue, spike trisetum, and blue wildrye.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on northerly aspects and below 7,000-feet elevation and whitebark pine/subalpine fir habitat types on ridges and southerly aspects above 7,000-feet elevation. Subalpine fir/woodrush is included. These habitat types are in about 70 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Grass/forb communities are on steep southerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess 14- to 20-inches thick or in loess mixed with subsoil material. The substrata are sandy.

Map Unit Composition

Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, have loess surface layers 14- to 20-inches thick and thin subsoils. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed, or Entic Cryumbrepts, sandy-skeletal, mixed. They have loess surface layers mixed with subsoil material or do not have subsoils. These soils are in about 70 percent of this map unit.

Rock outcrop and rubble land occur throughout this map unit. They are in about 20 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points. These soils have light-colored surface layers and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 5-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark brown to brown extremely gravelly sand.

Management

Timber

Potential annual production is usually less than 20 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Forest regeneration is limited by a harsh subalpine climate.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

33CA7—Typic Cryandepts, moderately steep mountain ridges, dry

This map unit is on mountain ridges. Elevation ranges from 5,600 to 8,300 feet. Vegetation consists of grassy balds. Most lower soil layers formed in material mainly derived from granitic rocks; some soil layers formed in material derived from andesite.

Landform

The dominant slopes have gradients of 10 to 50 percent. Mountain ridges have very broad ridges, convex side slopes, and concave draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel to dendritic first- and second-order drainageways. The channel gradients are moderate. The regolith water storage capacity is high, but runoff occurs when surface soils are bare of vegetation.

Vegetation

Typical vegetation consists of beargrass, Idaho fescue, elk sedge, Parry's rush, poke knotweed, yellow eriogonum, powder phlox, lupine, aster, and coiled lousewort.

Habitat Type Composition and Distribution

The major vegetation consists of grass/forb community types. They are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Whitebark pine/subalpine fir habitat types and subalpine fir/beargrass are in draws and on northerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess 14- to 20-inches thick or in loess mixed with subsoil material. The substrata are sandy.

Map Unit Composition

Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, have loess surface layers 14- to 20-inches thick and thick subsoils. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed, or Entic Cryumbrepts, sandy-skeletal, mixed. They have loess surface layers mixed with subsoil material or thin subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are at ridge points. These soils have light-colored surface layers. These soils have lower forage productivity. Typic Cryandepts, medial over loamy-skeletal, mixed, are associated with andesite bedrock. These soils have medium-textured substrata that are less erodible. Rock outcrop occurs on steep southerly aspects and at ridge points.

Up to 10 percent of this map unit is rock outcrop.

Representative Profile

Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark brown to brown extremely gravelly sand.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

The potential native plant community produces about 750 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Firelines have severe hazards of erosion. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

36A66—Andic Cryochrepts-Cryaquepts complex, nivational hollows

This map unit is in nivational hollows. Elevation ranges from 5,200 to 7,200 feet. Vegetation consists of subalpine and wet forest. The lower soil layers on upper side slopes formed in material derived from granitic rocks. The lower soil layers on lower slopes formed in stratified alluvial deposits or material derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Nivational hollows are concave, teardrop-shaped depressions at the head of drainageways on mountain slopes.

A first-order stream originates in this map unit. The channel gradients are low. Seeps and springs are common on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, and lodgepole pine. Douglas-fir is included on upper side slopes. Common understory plants on upper slopes are blue huckleberry, beargrass, grouse whortleberry, goldthread, menziesia, and Montana pea. Common understory plants on lower slopes are arrowleaf groundsel, Carolina bugbane, Sitka alder, ladyfern, northern false hellebore, stream boykinia, Canby's licorice-root, and mosses.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on upper slopes are subalpine fir/menziesia on northerly aspects and subalpine fir/beargrass on southerly aspects. Grand fir/queencup beadlily and grand fir/beargrass are included in a few delineations below 6,000-feet elevation. These habitat types are in about 70 percent of this map unit.

Subalpine fir/twisted stalk and subalpine fir/bluejoint are on lower slopes. A similar habitat type in a few delineations below 6,000-feet elevation is grand fir/arrowleaf groundsel. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities are in wet depressions with water tables near the surface.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position. Soils on upper slopes are well drained and have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soils on lower slopes have fluctuating water tables, which usually rise to or above the surface in the spring, and surface layers formed in loess or loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on upper slopes. These soils have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick and thick subsoils. These soils are in about 70 percent of this map unit.

Cryaquepts are on lower slopes. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt

loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year on upper slopes and 40±33 cubic feet per acre per year on lower slopes. On upper slopes site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On upper slopes On southerly aspects, moisture stress may limit forest regeneration. Tractor operation on lower slopes is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. On lower slopes, frost pockets limit forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water on lower slopes. Roads require suitable subgrade material across lower slopes because of wet soils with low strength. On lower slopes, cutbanks tend to slough. Unsurfaced roads on lower slopes rut and erode when wet. Material exposed by road construction on upper slopes tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on upper slopes ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. On lower slopes, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing on lower slopes should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have moderate hazards of erosion on upper slopes. The material exposed by road construction has severe hazards of erosion on upper slopes. Excavation for road construction and ruts caused by equipment operation may intercept ground water on lower slopes. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Lower slopes and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

36C66—Andic Cryochrepts-Cryaquepts complex, moderately steep nivational hollows

This map unit is on moderately steep nivational hollows. Elevation ranges from 5,200 to 7,200 feet. Vegetation consists of subalpine and wet forest. The lower soil layers on upper slopes formed in material derived from granitic rocks. The lower soil layers on lower slopes formed in alluvial deposits and material derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. Nivational hollows are concave, teardrop-shaped depressions at the head of drainageways on mountain slopes.

A first-order stream originates in this map unit. Seeps and springs are common on lower slopes. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, lodgepole pine, and grand fir. Douglas-fir is included on upper side slopes. Common understory plants on upper slopes are beargrass, blue huckleberry, grouse whortleberry, menziesia, goldthread, western meadowrue, and Montana pea. Common understory plants on lower slopes are arrowleaf groundsel, Carolina bugbane,

Sitka alder, ladyfern, northern false hellebore, stream boykinia, Canby's licorice-root, and mosses.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on upper slopes are subalpine fir/menziesia on northerly aspects and subalpine fir/beargrass on southerly aspects. Grand fir/queencup beadlily and grand fir/beargrass are included in a few delineations below 6,000-feet elevation. These habitat types are in about 70 percent of this map unit.

Subalpine fir/twisted stalk and subalpine fir/bluejoint are on lower slopes. A similar habitat type is grand fir/arrowleaf groundsel. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Alder/forb communities are in wet depressions with water tables near the surface.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position. Soils on upper slopes are well drained and have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soils on lower slopes have fluctuating water tables, which usually rise to or above the surface in the spring, and surface layers formed in loess or loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on upper slopes. These soils have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thick subsoils. These soils are in about 70 percent of this map unit.

Cryaquepts are on lower slopes. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly loamy coarse sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year on upper slopes and 40±33 cubic feet per acre per year on lower slopes. On upper slopes site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on upper slopes. Combinations of tractor and cable logging systems should be considered. On upper slopes On southerly aspects, moisture stress may limit forest regeneration. Tractor operation on lower slopes is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. On lower slopes, frost pockets limit forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water on lower slopes. Roads require suitable subgrade material across lower slopes because of wet soils with low strength. On lower slopes, cutbanks tend to slough. Unsurfaced roads on lower slopes rut and erode when wet. Material exposed by road construction on upper slopes tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on upper slopes ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. On lower slopes, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to

1,800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing on lower slopes should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Line skidding corridors, logging skid trails and firelines have moderate hazards of erosion on upper slopes. The material exposed by road construction has severe hazards of erosion on upper slopes. Excavation for road construction and ruts caused by equipment operation may intercept ground water on lower slopes. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Lower slopes and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

41E67—Cryochrepts-Rock outcrop complex, glacial cirques

This map unit is on glacial cirques and adjacent ridges. Elevation ranges from 5,600 to 8,300 feet. Vegetation consists of subalpine and open subalpine forest. The lower soil layers formed in material derived from granitic rocks and andesite.

Landform

The slope gradients range from 40 to more than 100 percent. Glacial cirques are bowl-shaped basins with headwalls. Glacial cirques have steep to nearly vertical headwalls and flat to gently sloping basin floors. The drainage pattern is weakly developed. First-order streams converge toward the basin floor. Cirque basins may contain small lakes. The regolith water storage capacity is limited by rock outcrop and bedrock at about 38 inches, and runoff occurs frequently.

Vegetation

Below 7,000-feet elevation, typical vegetation consists of mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir with some Douglas-fir included. Above 7,000-feet elevation, typical vegetation consists of open-grown stands of whitebark pine, lodgepole pine, and subalpine fir. Common understory plants are beargrass, elk sedge, woodrush, coiled lousewort, alpine spiraea, and grouse whortleberry.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Below 7,000-feet elevation, subalpine fir/beargrass is the major habitat type. A similar habitat type is subalpine fir/menziesia. Grand fir/beargrass is included in a few delineations below 6,000-feet elevation. Above 7,000-feet elevation, whitebark pine/subalpine fir is the major habitat type. Up to 20 percent of this map unit is made up of highly dissimilar habitat types. Grass/forb plant communities are on southerly aspects. Subalpine fir/twisted stalk and subalpine fir/bluejoint are near seeps on lower slopes. Fluctuating water tables limit forest regeneration. Up to 40 percent of this map unit is rock outcrop.

Characteristics of the Soils

The major soils have bedrock within 10 to 60 inches of the surface. The substrata are sandy.

Map Unit Composition

Cryochrepts are in about 50 percent of this map unit. Rock outcrop occurs on glacial cirque headwalls and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Cryumbrepts are on open ridges and in moist draws. These soils have dark-colored surface layers and lower timber productivity on open ridges. Fluctuating water tables in moist draws limits forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Cryochrepts have a dark brown gravelly loam surface layer. This surface layer is about 2-inches thick. The upper part of the subsoil is brown to dark brown gravelly silt loam about 7-inches thick. The lower part of the subsoil is brown to dark brown very gravelly loam about 5-inches thick. The substratum is yellowish brown and light yellowish brown very cobbly loamy sand to extremely stony sand overlying bedrock at about 38 inches.

Management

Timber

Sampled stands above 7,000-feet elevation have an annual production of less than 20 cubic feet per acre per year; below 7,000-feet elevation, productivity is 37±5 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Forest regeneration is limited at higher elevations by a harsh subalpine climate.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Revegetation is difficult because the material exposed by road construction is sandy, infertile, and droughty. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 25 pounds per acre per year of air-dry forage under a forest canopy to 100 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Erosion hazards for line skidding corridors, firelines, and the material exposed by road construction should be evaluated on site. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

42D67—Andic Cryochrepts-Dystric Cryochrepts complex, glacial cirques

This map unit is on glacial cirques. Elevation ranges from 5,400 to 7,800 feet. Vegetation consists of subalpine and open subalpine forest. The lower soil layers formed in material derived from granitic rocks on upper slopes and material derived from glacial till on lower slopes.

Landform

The dominant slopes have gradients of 40 to 60 percent. Glacial cirques are bowl-shaped basins with headwalls. Glacial cirques have steep to nearly vertical headwalls and flat to gently sloping basin floors. The drainage pattern is poorly developed. Low-order drainageways originate on cirque headwalls and converge toward cirque basins. Cirque basins may contain small lakes. The regolith water storage capacity on upper slopes is limited by bedrock at about 40 inches and high on lower slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Below 7,000-feet elevation, typical vegetation consists of stands of lodgepole pine, Engelmann spruce, and subalpine fir. Above 7,000-feet elevation, typical vegetation consists of open-grown stands of whitebark pine, lodgepole pine, and subalpine fir. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, woodrush, and sickletop lousewort.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Below 7,000-feet elevation, subalpine fir/beargrass is the major habitat type. Grand fir/queencup beadlily and grand fir/beargrass are included in a few delineations below 6,000-feet elevation. Above 7,000-feet elevation, whitebark pine/subalpine fir is the major habitat type.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are near seeps on lower slopes. Fluctuating water tables limit forest regeneration. Up to 10 percent of this map unit is rock outcrop or rubble land.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position. Soils on lower slopes have volcanic ash-influenced loess surface layers 7- to 14-inches thick. Soils on upper slopes have surface layers formed in loess mixed with subsoil material and bedrock within 40 to 60 inches of the surface.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on lower slopes. These soils have thin subsoils. The

similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 45 percent of this map unit.

Dystric Cryochrepts, sandy-skeletal, mixed, are on upper slopes. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils These soils are in about 35 percent of this map unit.

Up to 20 percent of this map unit is made up of dissimilar soils and rock outcrop. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in depressions on lower slopes. These soils have loess surface layers 14- to 20-inches thick. Fluctuating water tables limit forest regeneration. Rock outcrop occurs on cirque headwalls.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very cobbly sand. Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown very cobbly sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands below 7,000-feet elevation have an annual production of 37±5 cubic feet per acre per year. Above 7,000-feet elevation, annual production is less than 20 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing subsoil material with them. Steepness of slope limits tractor operation. At lower elevations, moisture stress may limit forest regeneration. Solar insolation on southerly aspects limits forest regeneration. At higher elevations, forest regeneration is limited by a harsh subalpine climate.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

42E67—Dystric Cryochrepts-Entic Cryumbrepts complex, glacial cirques

This map unit is on glacial cirques. Elevation ranges from 6,000 to 7,400 feet. Vegetation consists of subalpine and open subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landforms

The dominant slopes have gradients of 60 to 80 percent. Glacial cirques are bowl-shaped basins with headwalls. Glacial cirques have steep to nearly vertical headwalls and flat to gently sloping basin floors. The drainage pattern is weakly developed. First-order streams originate on cirque headwalls and converge toward the basin floor. Cirque basins may contain small lakes. Seeps are on lower slopes. The regolith water storage capacity is high on lower slopes and, on upper slopes, is limited by bedrock at about 40 inches. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation below 7,000-feet elevation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Open stands of subalpine fir, lodgepole pine, and whitebark pine are above 7,000-feet elevation. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, woodrush, sickletop lousewort, and menziesia.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Below 7,000-feet elevation, major habitat types are subalpine fir/beargrass on southerly aspects and subalpine fir/menziesia on northerly aspects. Above 7,000-feet elevation, whitebark pine/subalpine fir is the major habitat type. Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws and wet depressions. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are sandy. Soil properties vary with topographic position. Soils on lower slopes are deep and have light-colored surface layers. Soils on upper slopes have bedrock within 40 to 60 inches of the surface and dark-colored surface layers.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, are on lower slopes. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 45 percent of this map unit.

Entic Cryumbrepts, sandy-skeletal, mixed, are on upper slopes. These soils have dark-colored surface layers overlying coarse-textured substrata. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed. They have thin subsoils. These soils are in about 35 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are on lower slopes associated with subalpine fir/menziesia habitat types. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Rock outcrop occurs on upper slopes.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown and light yellowish brown extremely gravelly sand and extremely cobbly sand.

Entic Cryumbrepts, sandy-skeletal, mixed, have a very dark brown gravelly sandy loam surface layer. This surface layer is about 16-inches thick. The subsoil is dark yellowish brown extremely cobbly sand about 14-inches thick. The substratum is brown to dark brown very gravelly coarse sand overlying bedrock at about 39 inches.

Management

Timber

Sampled stands below 7,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and less than 20 cubic feet per acre per year above 7,000-feet elevation. Steepness of slope limits tractor operation. Forest regeneration is limited by a harsh subalpine climate at higher elevations. Solar insolation and moisture stress on southerly aspects at lower elevations limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed

in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

46A66—Andic Cryochrepts-Cryaquepts complex, gently sloping moraines

This map unit is on gently sloping moraines. Elevation ranges from 5,700 to 7,900 feet. Vegetation consists of subalpine and wet forest. The lower soil layers formed in glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 35 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed dense pattern of first-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Common understory plants on side slopes and ridges are beargrass, grouse whortleberry, woodrush, blue huckleberry, menziesia, and coiled lousewort. Common understory plants in moist draws and wet depressions are twinleaf marsh marigold, Jeffrey shooting star, sedges, arrowleaf groundsel, Canby's licorice-root, Modoc bog orchid, and mosses.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on southerly aspects and subalpine fir/menziesia on northerly aspects and along draws. Grand fir/beargrass and grand fir/queencup beadlily are included in a few delineations below 6,000-feet elevation. These habitat types are in about 60 percent of this map unit. Subalpine fir/bluejoint and subalpine fir/twisted stalk are in moist draws and wet depressions. These habitat types are in about 20 percent of this map unit. Highly dissimilar habitat types are in about 20 percent of this map unit. Sedge meadows are in some wet depressions. Whitebark pine/subalpine fir is above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position. Soils on side slopes and ridges are well drained and have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring, and surface layers formed in loess or loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, loamy-skeletal, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and thick subsoils. The similar soils are Entic Cryandepts, medial over loamy-skeletal, mixed, or Andic Cryochrepts, sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thin subsoils. These soils are in about 70 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts or Typic Cryandepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Andic Cryochrepts, loamy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very gravelly sandy loam to very cobbly loamy sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year on side slopes and

ridges and 40±33 cubic feet per acre per year in moist draws and wet depressions. On side slopes and ridges site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On side slopes and ridges On southerly aspects, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Forest regeneration is limited by frost pockets in moist draws and wet depressions. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

Unsurfaced roads are rough and difficult to blade because of large stones in areas. This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and wet depressions, cutbanks tend to slough. Material exposed by road construction on side slopes and ridges tends to erode, slough, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Logging skid trails and firelines have moderate hazards of erosion on side slopes and ridges. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

46AH5—Entic Cryandepts, gently sloping moraines

This map unit is on gently sloping moraines. Elevation ranges from 3,800 to 7,600 feet. Vegetation consists of subalpine forest. The lower soil layers formed in glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 10 to 30 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is weakly developed with first-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir. Common understory plants are blue huckleberry, beargrass, goldthread, and grouse whortleberry.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. The major habitat types are subalpine fir/beargrass and subalpine fir/menziesia above 6,000-feet elevation. Grand fir/queencup beadlily is included below 6,000-feet elevation. Highly dissimilar habitat types are in about 15 percent of this map unit. Whitebark pine/subalpine fir is on ridges above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Subalpine fir/twisted stalk and subalpine fir/arrowleaf groundsel are in moist draws and wet depressions. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 10- to 20-inches thick. The lower soil layers are loamy and have 0 to 60 percent rock fragments.

Map Unit Composition

Entic Cryandepts, medial over loamy-skeletal, mixed, have thin dark-colored surface layers, loess surface layers 14- to 20-inches thick and do not have subsoil clay accumulations. The similar soils are Typic Cryandepts, medial over loamy-skeletal, mixed; Andic Cryochrepts, loamy-skeletal, mixed; or Andeptic Cryoboralfs, loamy-skeletal, mixed. They have thick dark-colored surface layers, loess surface layers 10- to 14-inches thick, or subsoil clay accumulations. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on upper slopes and southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

Representative Profile

Entic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown very cobbly loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown very cobbly sandy loam.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Moisture stress may limit forest regeneration. Frost pockets in draws also limits forest regeneration.

Roads

Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because of moisture stress.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Logging skid trails and firelines have slight hazards of erosion. The material exposed by road construction has moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

46AHC—Eutric Glossoboralfs, gently sloping moraines

This map unit is on gently sloping moraines. Elevation ranges from 4,800 to 5,500 feet. These moraines are near Sawyer Ridge. Vegetation consists of mixed coniferous forest. The lower soil layers formed in glacial till derived from quartzite and schist.

Landform

The dominant slopes have gradients of 10 to 30 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed pattern of first-order drainageways with long reaches. The channel gradients are low. The regolith water storage capacity is high, but slowly permeable subsoils perch water, and runoff may occur.

Vegetation

Typical vegetation consists of mixed stands of grand fir, lodgepole pine, ponderosa pine, Douglas-fir, and western larch. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, northern twinflower, prince's pine, and sickletop lousewort.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on upper slopes and southerly aspects and grand fir/queencup beadlily on northerly aspects and lower slopes. A similar habitat type is grand fir/twinflower. These habitat types are in about 80 percent of this map unit. Highly dissimilar habitat and community types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration. Sedge meadows and alder/forb

communities are in wet depressions with water tables near the surface.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 14-inches thick and subsoil clay accumulations. The substrata are loamy and contain 0 to 60 percent rock fragments.

Map Unit Composition

Eutric Glossoboralfs, loamy-skeletal, mixed, do not have dense, brittle subsoils. The similar soils are Typic Fragiboralfs, loamy-skeletal, mixed. They have dense, brittle subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Aquic Glossoboralfs, loamy-skeletal, mixed, and Typic Umbraqualfs, loamy-skeletal, mixed, frigid, are in moist draws and wet depressions. These soils have mottled or gleyed subsoils. Fluctuating water tables limit forest regeneration.

Representative Profile

Eutric Glossoboralfs, loamy-skeletal, mixed, have a brown to dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark yellowish brown and brown to dark brown extremely cobbly sandy loam and very gravelly sandy loam about 22-inches thick. The lower part of the subsoil to a depth of 60 inches is yellowish brown very gravelly sandy clay loam.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On southerly aspects, moisture stress may limit forest regeneration. Forest regeneration is limited by frost pockets in draws.

Roads

Material exposed by road construction tends to erode and slough on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads rut and erode and are slippery when wet.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed.

Watershed

Logging skid trails, firelines, and the material exposed by road construction have moderate hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

46C65—Andic Cryochrepts and Dystric Cryochrepts, moderately steep moraines

This map unit is on moderately steep moraines. Elevation ranges from 4,700 to 7,800 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in glacial till derived from granitic rocks and quartzite.

Landform

The dominant slopes have gradients of 25 to 45 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed dense pattern of first-order drainageways. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of stands of subalpine fir, Engelmann spruce, and lodgepole pine. Grand fir and Douglas-fir are included below 6,000-feet elevation. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, smooth woodrush, and elk sedge.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. The major habitat types above 6,000-feet elevation are subalpine fir/beargrass and subalpine fir/menziesia. Below 6,000-feet elevation, grand fir/queencup beadlily is the major habitat type. Highly

dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws and wet depressions. Fluctuating water tables limit forest regeneration. Whitebark pine/subalpine fir is above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with elevation and source of glacial till. Soils below 6,000-feet elevation with substrata formed in glacial till derived from gneiss, schist, or quartzite have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soils above 6,000-feet elevation with substrata formed in glacial till derived from granitic rocks have surface layers formed in loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are below 6,000-feet elevation. These soils have loess surface layers 7- to 14-inches thick. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick.

Dystric Cryochrepts, sandy-skeletal, mixed, are above 6,000-feet elevation. Every delineation has at least one of these soils and may have all. Dissimilar soils make up about 10 percent of this map unit. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws and wet depressions. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow extremely gravelly loamy coarse sand.

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown extremely gravelly sand and light yellowish brown extremely gravelly sand.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. Site productivity is highly dependent on loess surface layers below 6,000-feet elevation. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Above 6,000-feet elevation, moisture stress may limit forest regeneration. Forest regeneration is limited by frost pockets in draws.

Roads

Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for grazing.

Watershed

Logging skid trails, line skidding corridors, and firelines have slight hazards of erosion below 6,000-feet elevation and moderate hazards of erosion above 6,000-feet elevation. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

46C66—Andic Cryochrepts-Cryaquepts complex, moderately steep moraines

This map unit is on moderately steep moraines. Elevation ranges from 4,800 to 7,400 feet. Vegetation consists of subalpine and wet forest. The lower soil layers formed in glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 25 to 45 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed dense pattern of first-order drainageways. The channel gradients are moderate. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Common understory plants are beargrass, grouse whortleberry, woodrush, blue huckleberry, menziesia, and coiled lousewort. Common understory plants in moist draws and wet depressions are twinleaf marsh marigold, Jeffrey shooting star, sedges, arrowleaf groundsel, Canby's licorice-root, Modoc bog orchid, and mosses.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types on side slopes and ridges are subalpine fir/beargrass on southerly aspects and subalpine fir/menziesia near draws and on northerly aspects. Grand fir/beargrass and grand fir/queencup beadlily are included in some delineations below 6,000-feet elevation. These habitat types are in about 70 percent of this map unit. Subalpine fir/bluejoint and subalpine fir/twisted stalk are in moist draws and wet depressions. These habitat types are in about 20 percent of this map unit. Highly dissimilar habitat and community types are in about 20 percent of this map unit. Sedge meadows are in wet depressions with water tables near the surface. Whitebark pine/subalpine fir is above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with topographic position.

Soils on side slopes and ridges are well drained and have volcanic ash-influenced loess surface layers 7- to 18-inches thick. Soils in moist draws and wet depressions have fluctuating water tables, which usually rise to or above the surface in the spring, and surface layers formed in loess or loess mixed with subsoil material.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, are on side slopes and ridges. These soils have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick and thick subsoils. These soils are in about 60 percent of this map unit.

Cryaquepts are in moist draws and wet depressions. These soils have thin dark-colored surface layers and mottled or gleyed subsoils. The similar soils are Cryumbrepts. They have thick dark-colored surface layers and do not have mottled or gleyed subsoils. These soils are in about 30 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on side slopes on southerly aspects. These soils have loess surface layers mixed with subsoil material and lower timber productivity than the dominant soils.

Representative Profiles

Andic Cryochrepts, sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 13-inches thick. The upper 5 inches are brown to dark brown, and the lower 8 inches are yellowish brown. The subsoil is yellowish brown fine sandy loam about 5-inches thick. The substratum to a depth of 60 inches or more is brownish yellow and yellow very cobbly sand.

Cryaquepts have a dark brown silt loam surface layer. This surface layer is about 4-inches thick. The subsoil is dark gray silt loam about 10-inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray mottled with strong brown loamy sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year on side slopes and ridges and 40±33 cubic feet per acre per year in moist draws and wet depressions. On side slopes and ridges site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On side slopes and ridges On

southerly aspects, moisture stress may limit forest regeneration. Tractor operation in moist draws and wet depressions is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Forest regeneration is limited by frost pockets in moist draws and wet depressions. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils.

Roads

Unsurfaced roads are rough and difficult to blade because of large stones in areas. This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws and wet depressions, cutbanks tend to slough. Material exposed by road construction on side slopes and ridges tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Line skidding corridors, logging skid trails, and firelines on side slopes and ridges have moderate hazards of erosion. The material exposed by road construction on side slopes and ridges have severe hazards of erosion. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and wet depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

46D67—Dystric Cryochrepts, steep moraines

This map unit is on steep moraines. Elevation ranges from 4,300 to 7,200 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 60 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed dendritic pattern of parallel first- and second-order drainageways. The channel gradients are high. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of stands of subalpine fir, Engelmann spruce, and lodgepole pine. Grand fir and Douglas-fir are included below 6,000-feet elevation. Whitebark pine is included above 6,000-feet elevation. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, and elk sedge.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. The major habitat types above 6,000-feet elevation are subalpine fir/beargrass and subalpine fir/menziesia. Below 6,000-feet elevation, grand fir/beargrass is the major habitat type. Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir is above 7,000-feet elevation on southerly aspects. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws and wet depressions. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The soil surface is stony or bouldery. The substrata are sandy.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 80 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are on northerly aspects and lower slopes. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Typic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown and light yellowish brown extremely gravelly sand and very cobbly sand.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Frost pockets in draws also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

46D6P—Dystric Cryochrepts-Typic Cryandepts complex, steep moraines

This map unit is on steep moraines. Elevation ranges from 4,300 to 7,200 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and grassy balds. The lower soil layers formed in glacial till derived from andesite.

Landform

The dominant slopes have gradients of 40 to 60 percent. Moraines are rolling to hilly glacial till deposits. The drainage pattern is a weakly developed dense pattern of parallel first-order drainageways. The channel gradients are high. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation in forest stands consists of mixed stands of grand fir, Engelmann spruce, and Douglas-fir. Subalpine fir and whitebark pine are included above 6,500-feet elevation. Common understory plants are blue huckleberry, grouse whortleberry, elk sedge and mosses. In forest openings, common plants are Idaho fescue, elk sedge, poke knotweed, yellow eriogonum, powder phlox, beargrass, aster, and lupine.

Habitat Type Composition and Distribution

About 80 percent of this map unit is forested. The major habitat type is grand fir/blue huckleberry. A similar habitat type is subalpine fir/blue huckleberry. Subalpine fir/beargrass is included above 6,500 feet. These habitat types are in about 90 percent of forest stands. Grass/forb community types are above 7,200-feet elevation and on southerly aspects. These community types are in about 20 percent of this map unit. Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and grand fir/arrowleaf groundsel are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess or loess mixed with subsoil material. The lower soil layers are loamy and contain more than 60 percent rock fragments. Soil properties vary with vegetation. Soils under forest stands have light-colored surface layers. Soils in forest openings have dark-colored surface layers. The soil surface is stony or bouldery.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, are under forest stands. These soils have volcanic ash-influenced loess mixed with subsoil material. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have volcanic ash-influenced loess surface layers. These soils are in about 70 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in forest openings. These soils have volcanic ash-influenced loess surface layers. The similar soils are Typic Cryumbrepts, loamy-skeletal, mixed. They have volcanic ash-influenced loess mixed with subsoil material. These soils are in about 30 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Dystric Cryochrepts, loamy-skeletal, mixed, have a dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum to a depth of 60 inches or more is brown to dark brown extremely gravelly sandy loam.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The upper part of the subsoil is brown to dark brown very gravelly loam about 10-inches thick. The lower part of the subsoil to a depth of 60 inches is dark brown to brown extremely gravelly sandy loam.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year in forest stands. Map unit productivity is reduced by grassy balds. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Frost pockets in draws also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to slough and ravel on steep cutbanks. Revegetation is difficult because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

The potential native plant community in grassy balds produces about 750 pounds per acre per year of air-dry forage. Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

47A66—Cryandepts-Cryumbrepts complex, glacial trough bottoms

This map unit is on gently sloping glacial trough bottoms and in cirque basins. Elevation ranges from 3,800 to 7,400 feet. Vegetation consists of subalpine and wet forest. The lower soil layers formed in glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 0 to 25 percent. Glacial trough bottoms are hummocky and hilly glacial drift deposits in narrow U-shaped glacial valleys.

The map unit delineations parallel streams, and most of the area is within 100 feet of a stream. Tributary streams may enter from adjacent uplands. The channel gradients are low. Cirque basin lakes and ponds are associated with this map unit. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of subalpine fir, Engelmann spruce, and lodgepole pine. Douglas-fir is on hummocks, and grand fir is at lower elevations. Common understory plants on side slopes are beargrass, grouse whortleberry, goldthread, blue huckleberry, and menziesia. Common understory plants in moist draws and wet depressions are sedges, Labrador tea, Jeffrey shooting star, northern false hellebore, arrowleaf groundsel, claspleaf twisted stalk, and Canby's licorice-root.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types are subalpine fir/beargrass on hummocks and subalpine fir/menziesia on lower slopes and near draws. Grand fir/beargrass and grand fir/queencup beadlily are included below 5,500-feet elevation. Western red cedar/queencup beadlily is included in a few delineations in the Selway River drainageway. These habitat types are in about 70 percent of this map unit.

Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws and wet depressions with fluctuating water tables. These habitat types are in about 20 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Shrub/forb communities and sedge meadows are in wet depressions with water tables near the surface.

Characteristics of the Soils

Lower soil layers are sandy. Soil properties vary with topography. Soils on hummocks are well drained and have volcanic ash-influenced loess surface layers 14- to 20-inches thick. Soils in moist draws and depressions have fluctuating water tables, which usually rise to or above the surface in the spring, and surface layers formed in loess or loess mixed with subsoil material.

Map Unit Composition

Cryandepts are on hummocks. These soils are in about 80 percent of this map unit.

Cryumbrepts are in moist draws and depressions. These soils do not have mottled or gleyed subsoils. The similar soils are Cryaquepts. They have mottled or gleyed subsoils. These soils are in about 20 percent of this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Cryandepts have a very dark brown and very dark grayish brown loam surface layer. This surface layer is about 16-inches thick. The upper part of the subsoil is dark yellowish brown silt loam about 4-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown loamy sand and gravelly sand.

Cryumbrepts have a very dark brown and dark brown loam surface layer. This surface layer is about 15-inches thick. The subsoil is dark yellowish brown loam about 13-inches thick. The substratum to a depth of 60 inches or more is dark brown with a few strong brown mottles stratified gravelly loamy sand and sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year on hummocks and 40±33 cubic feet per acre per year in moist draws and depressions. On hummocks, site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. On hummocks, moisture stress may limit forest regeneration. In moist draws and depressions, tractor operation is limited by wet soils with low strength. Rutting and puddling of the soil may reduce soil productivity. Fluctuating water tables are common in moist draws and may limit forest regeneration. A hazard of windthrow is associated with wet soils. Forest regeneration is also limited by frost pockets in moist draws.

Roads

Unsurfaced roads rut and erode when wet. This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws, cutbanks tend to slough. Material exposed by road construction on hummocks tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on hummocks ranges from about 50 pounds per acre per year of

air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. In moist draws, understory forage productivity ranges from about 800 pounds per acre per year of air-dry forage under a forest canopy to 1,800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

The major concern of watershed management is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Disturbing the soils on or adjacent to streambanks may increase stream sediment. Logging skid trails, firelines, and the material exposed by road construction have moderate hazards of erosion on hummocks. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Most of this map unit is a riparian area. Conservation practices to protect riparian values may be required when managing adjacent uplands.

47A6P—Dystric Cryochrepts, glacial trough bottoms

This map unit is on gently sloping glacial trough bottoms and in cirque basins. Elevation ranges from 3,600 to 7,700 feet. Vegetation consists of subalpine forest and cold mixed coniferous forest. The lower soil layers formed in glacial till derived from andesite.

Landform

The dominant slopes have gradients of 5 to 40 percent. Glacial trough bottoms are hummocky and hilly glacial drift deposits in narrow U-shaped glacial valleys.

The map unit delineations parallel streams, and most of the area is within 100 feet of a stream. Tributary streams may enter from adjacent uplands. The channel gradients are low. The regolith water storage capacity is high, and runoff is rare. Cirque basin lakes and ponds are associated with this map unit.

Vegetation

Typical vegetation above 6,000-feet elevation consists of mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir. Below 6,000-feet elevation, stands are mixed grand fir, western larch, Douglas-fir, and lodgepole pine. Common understory plants are blue huckleberry, grouse whortleberry, beargrass, Sitka valerian, and prince's pine.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Above 6,000-feet elevation, major habitat types are subalpine fir/beargrass on upper slopes and subalpine fir/menziesia on lower slopes and near draws. Subalpine fir/blue huckleberry is included. Below 6,000-feet elevation, grand fir/blue huckleberry is the major habitat type.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel, subalpine fir/twisted stalk, and subalpine fir/bluejoint are in moist draws and wet depressions. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 2- to 10-inches thick or loess surface layers mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, have loess surface layers mixed with subsoil material and do not have subsoil clay accumulations. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed, or Andeptic Cryoboralfs, loamy-skeletal, mixed. They have loess surface layers 7- to 10-inches thick or subsoil clay accumulations. These soils are in about 90 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws, wet depressions, and lower slopes. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown and light yellowish brown extremely gravelly silt loam.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. The terrain is well suited to tractor operation. Moisture stress may limit forest regeneration. Frost pockets in draws also limits forest regeneration.

Roads

Material exposed by road construction tends to slough on steep cutbanks. Revegetation is difficult because of moisture stress. Unsurfaced roads are slippery when wet.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

The major concern of watershed management is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Disturbing the soils on or adjacent to streambanks may increase stream sediment. Logging skid trails and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Most of this map unit is a riparian area and is potentially important to wildlife, fisheries, and watershed. Conservation practices to protect riparian values may be required when managing adjacent uplands.

48C65—Andic Cryochrepts, glacial trough walls

This map unit is on moderately steep glacial trough walls. Elevation ranges from 4,800 to 7,400 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in material derived from granitic rocks or glacial till derived from these rocks.

Landform

The dominant slopes have gradients of 25 to 50 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of parallel first-order drainageways with short reaches. The channel gradients are moderate. The regolith water storage capacity is limited by bedrock at 40 to 60 inches on upper slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation above 6,000-feet elevation is mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce. Below 6,000-feet elevation, stands are mixed lodgepole pine and grand fir. Common understory plants are beargrass, elk sedge, grouse whortleberry, and smooth woodrush.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Above 6,000-feet elevation, major habitat types are subalpine fir/beargrass on southerly aspects and upper slopes and subalpine fir/menziesia on northerly aspects and near draws. Below 6,000-feet elevation, major habitat types are grand fir/beargrass and grand fir/queencup beadlily.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration. Whitebark pine/subalpine fir is above 7,000-feet elevation and has lower timber productivity than the major habitat types.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 18-inches thick and sandy substrata. Bedrock is at 40 to 60 inches on upper slopes and deeper than 60 inches on lower slopes.

Map Unit Composition

Andic Cryochrepts, sandy-skeletal, mixed, have loess surface layers 7- to 14-inches thick and thin subsoils. The similar soils are Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, or Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 14- to 18-inches thick or thick subsoils. These soils are in about 75 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 25 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, are on southerly aspects. These soils have loess surface layers mixed with

subsoil material and lower timber productivity than the dominant soils. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop occurs on upper slopes.

Representative Profile

Andic Cryochrepts, sandy-skeletal, mixed, have a surface layer. This surface layer is about 13-inches thick. The upper 5 inches are a brown to dark brown silt loam, and the lower 8 inches are yellowish brown gravelly silt loam. The subsoil is yellowish brown gravelly fine sandy loam about 5-inches thick. The substratum is brownish yellow and yellow extremely cobbly sand overlying bedrock at about 50 inches.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year above 6,000-feet elevation and 51±3 cubic feet per acre per year below 6,000-feet elevation. Site productivity is highly dependent on loess surface layers. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48C6P—Dystric Cryochrepts, glacial trough walls

This map unit is on moderately steep glacial trough walls. Elevation ranges from 5,600 to 8,100 feet. Vegetation consists of subalpine forest and open subalpine forest. The lower soil layers formed in material derived from andesite or glacial till derived from andesite.

Landform

The dominant slopes have gradients of 30 to 45 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of parallel first-order drainageways with short reaches. The channel gradients are moderate. The regolith water storage capacity is limited on upper slopes by bedrock at 40 to 60 inches and high on lower slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation below 7,200-feet elevation is mixed stands of subalpine fir, Engelmann spruce, lodgepole pine, and Douglas-fir. Above 7,200-feet elevation, stands are mixed lodgepole pine, whitebark pine, and subalpine fir. Common understory plants are beargrass, blue huckleberry, and grouse whortleberry.

Habitat Type Composition and Distribution

Habitat type groups are undifferentiated in this map unit. Below 7,200-feet elevation subalpine fir/beargrass on southerly aspects and subalpine fir/menziesia on northerly aspects and near draws are major habitat types. Subalpine fir/blue huckleberry is included. Above 7,200-feet elevation, whitebark pine/subalpine fir is the major habitat type.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have volcanic ash-influenced loess surface layers 7- to 10-inches thick or loess surface layers mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches on upper slopes and deeper than 60 inches on lower slopes.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, have loess surface layers mixed with subsoil material. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 7- to 10-inches thick. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop occurs on upper slopes.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum is yellowish brown and light yellowish brown extremely cobbly sandy loam overlying bedrock at about 50 inches.

Management

Timber

Sampled stands have an annual production of less than 20 cubic feet per acre per year above 7,200-feet elevation and 37±5 cubic feet per acre per year below 7,200-feet elevation. Steepness of slope limits tractor operation on part of this map unit. Combinations of tractor and cable logging systems should be considered. Forest regeneration is limited by a harsh subalpine climate above 7,200-feet elevation. Below 7,200-feet elevation On southerly aspects, moisture stress may limit forest regeneration.

Roads

Material exposed by road construction tends to slough and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, logging skid trails, and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48D67—Dystric Cryochrepts-Entic Cryumbrepts complex, steep glacial trough walls

This map unit is on steep glacial trough walls. Elevation ranges from 5,600 to 7,600 feet. Vegetation consists of subalpine and open subalpine forest. The lower soil layers formed in residual material and glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 40 to 60 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of a dense pattern of parallel first-order drainageways with short reaches. The channel gradients are high. The regolith water storage capacity is limited on upper slopes by bedrock at 40 to 60 inches and high on lower slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation below 7,200-feet elevation consists of stands of subalpine fir, lodgepole pine, and Engelmann spruce. Open-grown stands of lodgepole pine, whitebark pine, and subalpine fir are above 7,200-feet elevation. Common understory

plants are beargrass, blue huckleberry, grouse whortleberry, elk sedge, and woodrush.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types below 7,200-feet elevation are subalpine fir/beargrass on upper slopes and southerly aspects and subalpine fir/menziesia on northerly aspects and lower slopes. Grand fir/beargrass is included in a few delineations below 6,000-feet elevation. These habitat types are in about 60 percent of this map unit.

The major habitat type above 7,200-feet elevation is whitebark pine/subalpine fir. This habitat type occupies about 20 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material and sandy substrata. Soil properties vary with vegetation. Soils under dense forest at lower elevations have light-colored surface layers. Soils under open-grown forest at higher elevations have thick dark-colored surface layers.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, are under dense forest. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 50 percent of this map unit.

Entic Cryumbrepts, sandy-skeletal, mixed, are under open-grown forest. These soils do not have subsoils. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed. They have subsoils. These soils are in about 30 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are on northerly aspects and lower slopes. These soils have loess surface layers 7- to 10-inches thick and higher timber productivity than the dominant soils. Rock outcrop occurs on upper slopes.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown and light yellowish brown extremely cobbly sand.

Entic Cryumbrepts, sandy-skeletal, mixed, have a very dark brown sandy loam surface layer. This surface layer is about 16-inches thick. The substratum is dark yellowish brown extremely cobbly sand overlying bedrock at about 39 inches.

Management

Timber

Sampled stands below 7,200-feet elevation have an annual production of 37±5 cubic feet per acre per year and less than 20 cubic feet per acre per year above 7,200-feet elevation. Steepness of slope limits tractor operation. Forest regeneration is limited by a harsh subalpine climate at higher elevations. At lower elevations, moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48DH7—Dystric Cryochrepts-Entic Cryandepts complex, steep glacial trough walls

This map unit is on steep glacial trough walls. Elevation ranges from 4,800 to 7,200 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in residual material and glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 40 to 60 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of a weakly developed pattern of parallel first-order drainageways with short reaches. The channel gradients are high. The regolith water storage capacity is limited on upper slopes by bedrock at 40 to 60 inches and high on lower slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation above 6,000-feet elevation consists of mixed stands of lodgepole pine, subalpine fir, and Engelmann spruce. Below 6,000-feet elevation, stands are mixed grand fir, lodgepole pine, and Douglas-fir. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, and menziesia.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. Grand fir/beargrass and grand fir/queencup beadlily are major habitat types below 6,000-feet elevation. These habitat types are in about 50 percent of this map unit.

Subalpine fir/beargrass and subalpine fir/menziesia are major habitat types above 6,000-feet elevation. These habitat types are in about 30 percent of this map unit.

Grand fir/beargrass and subalpine fir/beargrass are on southerly aspects, and grand fir/queencup beadlily and subalpine fir/menziesia are on northerly aspects.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Lower soil layers are sandy. Soil properties vary with topographic position. Soils on upper slopes and southerly aspects have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects and lower slopes have volcanic ash-influenced loess surface layers 10- to 20-inches thick.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, are on upper slopes and southerly aspects. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 50 percent of this map unit.

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, are on northerly aspects and lower slopes. These soils have loess surface layers 14- to 20-inches thick and thin subsoils. The similar soils are Andic Cryochrepts, sandy-skeletal, mixed, or Entic Cryandepts, medial over loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or thick subsoils. These soils are in about 30 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop occurs on upper slopes.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown extremely cobbly sand overlying bedrock at about 40 inches.

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to

dark brown very gravelly sandy loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown extremely cobbly sand.

Management

Timber

Sampled stands below 6,000-feet elevation have an annual production of 51±3 cubic feet per acre per year and 37±5 cubic feet per acre per year above 6,000-feet elevation. Site productivity is highly dependent on loess surface layers on northerly aspects and lower slopes. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to erode, slough, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and slight hazards of erosion on northerly aspects. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48DHP—Dystric Cryochrepts, steep glacial trough walls

This map unit is on steep glacial trough walls. Elevation ranges from 4,600 to 7,800 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in residual material and glacial till derived from andesite.

Landform

The dominant slopes have gradients of 45 to 60 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of a dense pattern of parallel first-order drainageways with short reaches. The channel gradients are high. The regolith water storage capacity is limited on upper slopes by bedrock at 40 to 60 inches and high on lower slopes. Runoff may occur on upper slopes but becomes subsurface flow on lower slopes.

Vegetation

Typical vegetation above 6,000-feet elevation consists of mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir. Below 6,000-feet elevation, stands are mixed lodgepole pine, grand fir, and Douglas-fir. Common understory plants are blue huckleberry, grouse whortleberry, and beargrass. Mountain maple, mallow ninebark, snowberry, and Saskatoon serviceberry are below about 5,500-feet elevation.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types above 6,000-feet elevation are subalpine fir/beargrass on upper slopes and subalpine fir/menziesia on lower slopes. Subalpine fir/blue huckleberry is included. These habitat types are in about 40 percent of this map unit.

Below 6,000-feet elevation, grand fir/blue huckleberry is the major habitat type. Douglas-fir/mallow ninebark is included. These habitat types are in about 30 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration. Whitebark pine/subalpine fir is above 7,200-feet elevation. This habitat type has lower timber productivity than the major habitat types.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Cryumbrepts, loamy-skeletal, mixed, are in moist draws. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration. Andic Cryochrepts, loamy-skeletal, mixed, are on northerly aspects. These soils have loess surface layers 7- to 10-inches thick and higher timber productivity than the dominant soils. Rock outcrop occurs on upper slopes.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown and light yellowish brown extremely cobbly silt loam.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year at higher elevations and 51±3 cubic feet per acre per year at lower elevations. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Solar insolation limits forest regeneration on southerly aspects.

Roads

Hard rock occasionally limits excavation. Material exposed by road construction tends to slough on steep cutbanks. Revegetation is difficult because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48E67—Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls

This map unit is on very steep glacial trough walls. Elevation ranges from 4,400 to 7,800 feet. Vegetation consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in residual material and glacial till derived from granitic rocks.

Landform

The dominant slopes have gradients of 60 to 80 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of parallel first-order drainageways. The channel gradients are high. The regolith water storage capacity is limited by bedrock at 40 to 60 inches, and runoff may occur.

Vegetation

Typical vegetation above 6,000-feet elevation consists of mixed stands of lodgepole pine, subalpine fir, and Engelmann spruce. Mixed stands of Douglas-fir, grand fir, and western larch are below 6,000-feet elevation. Common understory plants are beargrass, blue huckleberry, grouse whortleberry, rattlesnake plantain, and elk sedge.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types above 6,000-feet elevation are subalpine fir/ beargrass on upper slopes and southerly aspects and subalpine fir/menziesia on northerly aspects and lower slopes. These habitat types are in about 25 percent of this map unit.

Below 6,000-feet elevation, grand fir/beargrass is on ridges and southerly aspects and grand fir/queencup beadlily is on northerly aspects and lower slopes. These habitat types are in about 25 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir habitat types are on ridges and southerly aspects above 7,000-feet elevation. They have lower timber productivity than the major habitat types. Subalpine fir/twisted stalk and grand fir/arrowleaf groundsel are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material and sandy substrata. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Entic Cryumbrepts, sandy-skeletal, mixed, are under open forest stands. These soils have thick dark-colored surface layers and lower timber productivity than the dominant soils. Typic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have thick dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown very stony sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. Steepness of slope and rock outcrop limit tractor operation. On southerly aspects, solar insolation and moisture stress may limit forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode, slough, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48E6P—Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls, andesite substratum

This map unit is on very steep glacial trough walls. Elevation ranges from 3,600 to 8,000 feet. Vegetation

consists of cold mixed coniferous forest and subalpine forest. The lower soil layers formed in residual material and glacial till derived from andesite.

Landform

The dominant slopes have gradients of 60 to 80 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of parallel first-order drainageways with short reaches. The channel gradients are high. The regolith water storage capacity is limited by bedrock at 40 to 60 inches, and runoff may occur.

Vegetation

Typical vegetation above 6,000-feet elevation consists of stands of subalpine fir, Engelmann spruce, and lodgepole pine. Below 6,000-feet elevation, typical vegetation consists of stands of Douglas-fir, grand fir, and lodgepole pine. Common understory plants are blue huckleberry, grouse whortleberry, beargrass, and menziesia. Mountain maple, snowberry, Saskatoon serviceberry, and mallow ninebark are below 5,500-feet elevation.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types above 6,000-feet elevation are subalpine fir/beargrass on upper slopes and southerly aspects and subalpine fir/menziesia on northerly aspects and lower slopes. These habitat types are in about 25 percent of this map unit. The major habitat types below 6,000-feet elevation are subalpine fir/blue huckleberry and grand fir/blue huckleberry. Douglas-fir/mallow ninebark is included on steep southerly aspects. These habitat types are in about 25 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir habitat types are above 7,200-feet elevation on ridges and southerly aspects. These soils have lower timber productivity than the major habitat types. Subalpine fir/twisted stalk and grand fir/arrowleaf groundsel are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess 7- to 10-inches thick or loess surface layers mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, have surface layers formed in loess mixed with subsoil material. The similar soils are Andic Cryochrepts, loamy-skeletal, mixed. They have loess surface layers 7- to 10-inches thick. These soils are in about 50 percent of this map unit.

Rock outcrop occurs on upper slopes and occupies about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Cryumbrepts, loamy-skeletal, mixed, are under open forest stands on southerly aspects and in moist draws. These soils have thick dark-colored surface layers. On southerly aspects, they are well drained and have lower timber productivity than the dominant soils. Fluctuating water tables in moist draws limits forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a brown or dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum is yellowish brown and light yellowish brown extremely cobbly sandy loam overlying bedrock at about 40 inches.

Management

Timber

Sampled stands above 6,000-feet elevation have an annual production of 37±5 cubic feet per acre per year and 51±3 cubic feet per acre per year below 6,000-feet elevation. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. On southerly aspects, solar insolation and moisture stress may limit forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors and firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

48E77—Entic Cryumbrepts-Rock outcrop complex, very steep glacial trough walls

This map unit is on very steep glacial trough walls. Elevation ranges from 5,600 to 8,200 feet. Vegetation consists of open subalpine forest. The lower soil layers formed in residual material and glacial till derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 60 to 90 percent. Glacial trough walls have straight to convex upper slopes and concave lower slopes.

The drainage pattern consists of parallel first-order drainageways with short reaches. The channel gradients are high. The regolith water storage capacity is limited by bedrock at 20 to 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of whitebark pine and subalpine fir. Douglas-fir is included below 6,800-feet elevation. Common understory plants are beargrass, elk sedge, woodrush, poke knotweed, powder phlox, and yellow eriogonum.

Habitat Type Composition and Distribution

The major habitat types are whitebark pine/subalpine fir. Subalpine fir/beargrass is included on mid to lower side slopes. These habitat types are in about 40 percent of this map unit.

Highly dissimilar habitat and community types are in about 20 percent of this map unit. Subalpine fir/menziesia is on lower side slopes and in draws. This habitat type has higher timber productivity than the major habitat types. Grass/forb communities are in forest openings on steep southerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material and sandy substrata. Bedrock is within 20 to 40 inches of the surface.

Map Unit Composition

Entic Cryumbrepts, sandy-skeletal, mixed, do not have subsoils. The similar soils are Typic Cryumbrepts, sandy-skeletal, mixed. They have subsoils. These soils are in about 40 percent of this map unit.

Rock outcrop occurs on upper slopes and occupies about 40 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Dystric Cryochrepts, sandy-skeletal, mixed, and Dystric Cryochrepts, loamy-skeletal, mixed, are on lower slopes under dense forest stands. These soils have thin dark-colored surface layers and higher timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Entic Cryumbrepts, sandy-skeletal, mixed, have a very dark brown gravelly sandy loam surface layer. This surface layer is about 16-inches thick. The substratum is dark yellowish brown extremely cobbly sand overlying bedrock at about 39 inches.

Management

Timber

Sampled stands have an annual production of less than 20 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Forest regeneration is limited by a harsh subalpine climate.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

50CUU—Inceptisols, Mollisols, and Alfisols, moderately steep landslide deposits

This map unit is on moderately steep landslide deposits. Elevation ranges from 1,400 to 6,800 feet. Vegetation consists of usually similar to adjacent map units of similar slope and aspect. The lower soil layers formed in material derived from well-weathered rocks.

Landform

The dominant slopes have gradients of 20 to 50 percent. Landslide deposits have a hummocky surface with depressions.

The drainage pattern consists of dense parallel or dendritic first- and second-order drainageways. The channel gradients are moderate. The map unit is usually adjacent to larger-order streams. Sag ponds are where the drainageway system has been blocked by landslides. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Vegetation ranges from grassland on southerly aspects at low elevations to subalpine forest at high elevations.

Characteristics of the Soils

Soil properties vary with vegetation and parent material. Soils under dense forest formed in materials derived from granitic rocks or andesite have light-colored or moderately acid dark-colored surface layers and do not have subsoil clay accumulations. Soils under dense forest formed in materials derived from basalt, metasedimentary rocks, or schist have light-colored or moderately acid dark-colored surface layers and subsoil clay accumulations. Soils under grassland have neutral dark-colored surface layers.

Map Unit Composition

Inceptisols are under dense forest and are formed in material derived from granitic rocks or andesite. Alfisols are under dense forest and are formed in material derived from basalt, metasedimentary rocks, or schist. Mollisols are under grassland. Each delineation contains one of these soils and may contain all.

Representative Profiles

Inceptisols have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark brown silt loam about 12-inches thick. The lower part of the subsoil is brown to dark brown very cobbly loam about 25-inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam.

Mollisols have a very dark brown very gravelly loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown very cobbly loam about 35-inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly loam.

Alfisols have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is weak red clay loam about 10-inches thick. The lower part of the subsoil to a depth of 60 inches or more is reddish brown sandy clay loam and gravelly sandy clay loam.

Management

Timber

Potential annual production should be estimated based on that of adjacent map units of similar slope and aspect.

Roads

Suitability for road construction should be evaluated on site.

Range

Forage production and potential for transitory range should be estimated based on that of adjacent map units of similar slope and aspect.

Watershed

Erosion hazards should be evaluated on site. Road construction may cause landslides; evaluating slope stability on site is recommended.

Riparian Areas

Some sag ponds and moist draws are riparian areas. They are small and unlikely to significantly affect the management of adjacent uplands.

50EUU—Inceptisols and Mollisols, very steep landslide deposits

This map unit is on very steep landslide deposits. Elevation ranges from 1,400 to 6,800 feet. Vegetation consists of usually similar to adjacent map units of similar slope and aspect. The lower soil layers formed in material derived from well-weathered rocks.

Landform

The dominant slopes have gradients of 45 to 80 percent or more. Landslide deposits have a hummocky surface with depressions.

The drainage pattern consists of a dense pattern of parallel first-order drainageways. The map unit is usually adjacent to larger-order streams. The channel gradients are high. Sag ponds or wet depressions are where drainageway channels have been blocked by landslides. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Vegetation ranges from grassland on southerly aspects at low elevations to dense forest at higher elevations.

Characteristics of the Soils

Soil properties vary with vegetation. Soils under dense forest have light-colored or moderately acid dark-colored surface layers. Soils under grassland or open dry coniferous forest have neutral dark-colored surface layers.

Map Unit Composition

Inceptisols have light-colored or moderately acid dark-colored surface layers.

Mollisols have neutral dark-colored surface layers.

Each delineation contains one of these soils and may have both.

Rock outcrop is a dissimilar inclusion throughout and occupies up to 10 percent of this map unit.

Representative Profiles

Inceptisols have a dark brown silt loam surface layer. This surface layer is about 9-inches thick. The upper part of the subsoil is dark brown silt loam about 12-inches thick. The lower part of the subsoil is brown to dark brown very cobbly loam about 25-inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam.

Mollisols have a very dark brown very gravelly loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown very cobbly loam about 35-inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly loam.

Management

Timber

Potential annual production should be estimated based on that of adjacent map units of similar slope and aspect.

Roads

Suitability for road construction should be evaluated on site.

Range

Forage production and potential for transitory range should be estimated based on that of adjacent map units of similar slope and aspect.

Watershed

Erosion hazard should be evaluated on site. Road construction may cause landslides; evaluating slope stability on site is recommended.

Riparian Areas

Some sag ponds and wet depressions are riparian areas. They are small and unlikely to significantly affect the management of adjacent uplands.

60E1E—Ultic Argixerolls, undissected stream breaklands, dry

This map unit is on very steep undissected stream breaklands. Elevation ranges from 3,600 to 7,200 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes are on southerly aspects with gradients of 50 to 70 percent. Undissected stream breaklands have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate about halfway up the slope. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of bluebunch wheatgrass, rattlesnake brome, cheatgrass, arrowleaf balsamroot, and common yarrow.

Habitat Type Composition and Distribution

Plant communities are comparable to bluebunch wheatgrass/Sandberg bluegrass habitat type. Plant communities comparable to Idaho fescue/bluebunch wheatgrass habitat type are included at elevations above 5,000 feet. These community types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Ponderosa pine/bluebunch wheatgrass and ponderosa pine/snowberry are near draws and on toeslopes.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near rock outcrop. These soils have bedrock within 20 inches of the surface. Typic Haploxeralfs, loamy-skeletal, mixed, frigid, are at ridge points. These soils have thin dark-colored surface layers. These soils have lower forage productivity. Rock outcrop occurs throughout this map unit.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Material exposed by road construction is difficult to revegetate because of moisture stress. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads

constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

60E3F—Ultic Argixerolls, undissected stream breaklands

This map unit is on very steep undissected stream breaklands. Elevation ranges from 3,600 to 6,000 feet. Vegetation consists of dry mixed coniferous forest. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes are on northerly aspects with gradients of 50 to 70 percent. Undissected stream breaklands have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of Douglas-fir and ponderosa pine. Western larch, grand fir, and lodgepole pine are included above 4,500-feet elevation. Common understory plants are mallow ninebark, rose, mountain maple, mountain kittentails, elk sedge, bracted strawberry, and mosses.

Habitat Type Composition and Distribution

The major habitat types are grand fir/mallow ninebark above 4,500-feet elevation and Douglas-fir/mallow ninebark at lower elevations. Grand fir/blue huckleberry and grand fir/beargrass are included above 4,500-feet elevation. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have thick dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have subsoil clay accumulations. The similar soils are Ultic Haploxerolls, loamy-skeletal, mixed. They do not have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Dystrochrepts, loamy-skeletal, mixed, are above 5,000-feet elevation on northerly aspects. These soils have light-colored surface layers or thin dark-colored surface layers and higher timber productivity than the dominant soils.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Competition from understory vegetation also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed

by road construction has slight hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

60E48—Typic Dystrochrepts-Typic Vitrandepts complex, undissected stream breaklands

This map unit is on very steep undissected steam breaklands. Elevation ranges from 1,700 to 5,200 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 50 to 80 percent. Undissected stream breaklands have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Seeps and springs are at drainageway heads and on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of western red cedar, grand fir, Douglas-fir, and western larch. Engelmann spruce is included in frost pockets and above 4,000-feet elevation. Common understory plants are Pacific yew, mountain maple, snowberry, Utah honeysuckle, myrtle pachystima, blue huckleberry, queencup beadlily, goldthread, and sword hollyfern. Shrubs invade openings in the forest canopy.

Habitat Type Composition and Distribution

The major habitat types are western red cedar/queencup beadlily on northerly aspects and western red cedar/wild ginger on southerly aspects. Grand fir/queencup beadlily is included on steep upper slopes. Grand fir/wild ginger is included in places. These habitat types are in about 65 percent of this map unit.

Highly dissimilar habitat types are in about 25 percent of this map unit. Douglas-fir/mallow ninebark is on steep southerly aspects. This habitat type has lower timber productivity than the major habitat types. Western red cedar/ladyfern, western red cedar maidenhair fern, and grand fir/arrowleaf groundsel are in moist draws and on toeslopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with aspect. Soils on southerly aspects have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects have volcanic ash-influenced loess surface layers 14- to 20-inches thick.

Map Unit Composition

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects. These soils have 0 to 35 percent subsoil rock fragments and thick subsoils. The similar soils are Typic Dystrochrepts, loamy-skeletal, mixed, frigid, or Typic Dystrochrepts, sandy, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or thin subsoils. These soils are in about 45 percent of this map unit.

Typic Vitrandepts, medial over loamy, mixed, frigid, are on northerly aspects. These soils have 0 to 35 percent subsoil rock fragments, thick subsoils, and moderately coarse-textured substrata. The similar soils are Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid, or Typic Vitrandepts, medial over sandy or sandy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or thin subsoils and coarse-textured substrata. These soils are in about 30 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop comprise up to 25 percent of this map unit. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are sandy loam. The substratum to a depth of 60 inches or more is brown to dark brown gravelly loamy sand.

Typic Vitrandepts, medial over loamy, mixed, frigid, have a silt loam surface layer. This surface layer is

about 15-inches thick. The upper 5 inches are very dark grayish brown and the lower 10 inches are brown to dark brown. The subsoil is brown to dark brown gravelly coarse sandy loam about 22-inches thick. The substratum to a depth of 60 inches or more is light brownish gray sandy loam and light yellowish brown gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Competition from understory vegetation limits forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode, slough, and ravel on steep cutbanks. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and low hazards of erosion on northerly aspects. The material exposed by road construction has severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

60E67—Dystric Cryochrepts-Entic Cryandepts complex, undissected stream breaklands

This map unit is on very steep undissected stream breaklands. Elevation ranges from 5,400 to 7,900 feet. Vegetation consists of subalpine forest and open subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 50 to 70 percent. Undissected stream breaklands have narrow ridges, straight to convex side slopes, and V-shaped draw bottoms.

The drainage pattern consists of a weakly developed pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is often adjacent to larger-order streams, and stream order jumping is common.

Vegetation

Typical vegetation below 7,000-feet elevation consists of stands of subalpine fir, lodgepole pine, and Engelmann spruce. Douglas-fir is included below 6,500-feet elevation. Above 7,000-feet elevation, stands are mixed whitebark pine, subalpine fir, and lodgepole pine. Common understory plants are beargrass, grouse whortleberry, elk sedge, menziesia, and woodrush.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat types below 7,000-feet elevation are subalpine fir/beargrass and subalpine fir/menziesia. These habitat types are in about 45 percent of this map unit.

Whitebark pine/subalpine fir is above 7,000-feet elevation. This habitat type occupies about 25 percent of this map unit.

Highly dissimilar habitat and community types are in about 20 percent of this map unit. Grass/forb communities are in forest openings on upper slopes. Subalpine fir/twisted stalk and subalpine fir/bluejoint are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Lower soil layers are sandy. Soil properties vary with aspect. Soils on southerly aspects have surface

layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects have volcanic ash-influenced loess surface layers 10- to 20-inches thick.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, are on southerly aspects. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 50 percent of this map unit.

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, are on northerly aspects. These soils have loess surface layers 14- to 20-inches thick and thin subsoils. The similar soils are Andic Cryochrepts, sandy-skeletal, mixed, or Entic Cryandepts, medial over loamy-skeletal, mixed. They have loess surface layers 10- to 14-inches thick or thick subsoils. These soils are in about 30 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Cryandepts, medial over sandy or sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop occurs throughout this map unit.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum to a depth of 60 inches or more is yellowish brown extremely gravelly sand and light yellowish brown extremely cobbly loamy sand.

Entic Cryandepts, medial over sandy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 17-inches thick. The upper 4 inches are dark brown, and the lower 13 inches are brown. The upper part of the subsoil is brown to dark brown very gravelly sandy loam about 8-inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown to dark brown extremely cobbly loamy sand.

Management

Timber

Sampled stands have an annual production of 37±5 cubic feet per acre per year below 7,000-feet elevation and less than 20 cubic feet per acre per year above 7,000-feet elevation. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Forest regeneration is limited by a harsh subalpine climate above 7,000-feet elevation. Below 7,000-feet elevation, moisture stress may limit forest regeneration. Solar insolation limits forest regeneration on southerly aspects below 7,000-feet elevation.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A low percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E12—Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,900 to 6,600 feet. Vegetation consists of grassland. The

lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 80 to more than 100 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are very high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is limited by bedrock at 5 to 20 inches, and runoff may occur.

Vegetation

Typical vegetation consists of sparse stands of cheatgrass, rattlesnake brome, common yarrow, stoneseed, and arrowleaf balsamroot. Shrubs such as rubber rabbitbrush and big sagebrush are near rock outcrop in the southern part of the survey area.

Habitat Type Composition and Distribution

Plant communities are comparable to bluebunch wheatgrass/Sandberg bluegrass habitat type on upper slopes and below 4,000-feet elevation and Idaho fescue/bluebunch wheatgrass habitat type in depressions and above 4,000-feet elevation. These community types are in about 50 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Douglas-fir/mallow ninebark and ponderosa pine/snowberry are near draws and in depressions.

Characteristics of the Soils

The major soils have bedrock within 20 inches of the surface.

Map Unit Composition

Lithic Ultic Haploxerolls have dark-colored surface layers 7- to 13-inches thick. The similar soils are Lithic Dystric Xerochrepts. They have dark-colored surface layers 2- to 7-inches thick. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Ultic Haploxerolls are near draws and in depressions. These soils have bedrock deeper than 20 inches and are forested.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Lithic Ultic Haploxerolls have a very dark grayish brown gravelly loamy sand surface layer overlying bedrock at about 7 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E14—Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,800 to 5,400 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 60 to 90 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is limited by bedrock at 20 to 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of bluebunch wheatgrass, cheatgrass, Japanese brome, Sandberg bluegrass, Idaho fescue, common yarrow, and arrowleaf balsamroot. Shrubs such as big sagebrush, rubber rabbitbrush, curl-leaf mountain mahogany, and hackberry are near rock outcrop in the southern part of the survey area.

Habitat Type Composition and Distribution

Plant communities are comparable to Idaho fescue/bluebunch wheatgrass habitat type near draws and at elevations above 3,000 feet and bluebunch wheatgrass/Sandberg bluegrass habitat type on ridges and below 3,000-feet elevation. A similar community type is comparable to Idaho fescue/snowberry habitat type. These community types are in about 60 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Ponderosa pine/Idaho fescue and ponderosa pine/bluebunch wheatgrass are near draws. Shrub/forb communities are in moist draws. These habitat types have higher forage productivity than the major community types.

Characteristics of the Soils

Soil substrata are sandy. Bedrock is 20 to 40 inches below the surface. The major soils have thick dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material.

Map Unit Composition

Ultic Haploxerolls have dark-colored surface layers 7- to 20-inches thick. The similar soils are Pachic Ultic Haploxerolls. They have dark-colored surface layers 20- to 30-inches thick. These soils are in about 60 percent of this map unit.

Rock outcrop occurs on upper slopes and occupies about 20 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Lithic Ultic Haploxerolls are near rock outcrop and at ridge points. These soils have bedrock within 20 inches of the surface. Dystric Xerochrepts are at ridge points. These soils have thin dark-colored surface layers. These soils have lower forage productivity.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Ultic Haploxerolls have a very dark brown sandy loam surface layer. This surface layer is about 12-inches thick. The subsoil is yellowish brown sandy loam about 6-inches thick. The substratum is dark yellowish brown very cobbly loamy sand overlying bedrock at about 26 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 750 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E1E—Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands, dry

This map unit is on very steep dissected stream breaklands. Elevation ranges from 2,000 to 6,200 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes have gradients of 50 to 80 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of cheatgrass, rattlesnake brome, bluebunch wheatgrass, common yarrow, arrowleaf balsamroot, rose, and snowberry.

Habitat Type Composition and Distribution

Plant communities are comparable to bluebunch wheatgrass/Sandberg bluegrass habitat type. Similar community types are comparable to Idaho fescue/bluebunch wheatgrass and bluebunch wheatgrass/snowberry habitat types. These community types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Ponderosa pine/bluebunch wheatgrass and ponderosa pine/snowberry are near draws and on toeslopes.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are loamy and have 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 70 percent of this map unit.

Rock outcrop occurs throughout and occupies about 20 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near rock outcrop. These soils have bedrock within 20 inches of the surface and lower forage productivity.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly silt loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 550 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E1J—Lithic Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 2,100 to 5,800 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes are on southerly aspects with gradients of 60 to more than 100 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Water storage capacity is limited by bedrock at 5 to 20 inches, and runoff may occur.

Vegetation

Typical vegetation consists of sparse stands of bluebunch wheatgrass, rattlesnake brome, cheatgrass, common yarrow, and creeping hollygrape.

Habitat Type Composition and Distribution

Plant communities are comparable to bluebunch wheatgrass/Sandberg bluegrass habitat type. A similar community type is comparable to Idaho fescue/bluebunch wheatgrass habitat type. These community types are in about 50 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Ponderosa pine/snowberry is near draws and on toeslopes.

Characteristics of the Soils

The major soils have dark-colored surface layers and bedrock within 20 inches of the surface.

Map Unit Composition

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, have subsoil clay accumulations. The similar soils are Lithic Haploxerolls, loamy-skeletal, mixed, frigid. They do not have subsoil clay accumulations. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near draws and on toeslopes. These soils have bedrock 20 to 60 inches or more deep and higher forage productivity.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a very dark brown gravelly silt loam surface layer. This surface layer is about 9-inches thick. The subsoil is dark brown very cobbly silty clay loam overlying bedrock at about 12 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E22—Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 2,000 to 6,400 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 70 to more than 100 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are very high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is limited by bedrock at 5 to 20 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open or scattered stands of ponderosa pine with some Douglas-fir. Common understory plants are mallow ninebark, snowberry, pinegrass, bluebunch wheatgrass, Idaho fescue, and common yarrow.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/snowberry and ponderosa pine/mallow ninebark. A similar habitat type is ponderosa pine/bluebunch wheatgrass on ridges. Douglas-fir/mallow ninebark is included near draws, and Douglas-fir/Idaho fescue is included on ridges. These habitat types are in about 50 percent of this map unit.

Up to 10 percent highly dissimilar community types are included in this map unit. Grassland plant communities are on convex upper slopes.

Characteristics of the Soils

The major soils have bedrock within 20 inches of the surface.

Map Unit Composition

Lithic Ultic Haploxerolls have thick dark-colored surface layers. The similar soils are Lithic Dystric Xerochrepts. They have light-colored surface layers or thin dark-colored surface layers. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Ultic Haploxerolls are near draws and in depressions. These soils have bedrock 20 to 60 inches or more deep and higher timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Lithic Ultic Haploxerolls have a very dark grayish brown gravelly loamy sand surface layer overlying bedrock at about 7 inches.

Management

Timber

Sampled stands have annual production of about 22 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects limits forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 300 pounds per acre per year of air-dry forage under a forest canopy to 500 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E24—Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,600 to 6,400 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on southerly aspects with gradients of 60 to 90 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order streams that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is limited by bedrock at 20 to 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some Douglas-fir. Common understory plants are Idaho fescue, bluebunch wheatgrass, Japanese brome, lupine, arrowleaf balsamroot, common yarrow, brackenfern, and snowberry.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/Idaho fescue on upper slopes and ponderosa pine/snowberry and ponderosa pine/mallow ninebark on lower slopes. Douglas-fir/Idaho fescue and Douglas-fir/bluebunch wheatgrass are included. These habitat types are in about 50 percent of this map unit.

Highly dissimilar habitat and community types are in about 30 percent of this map unit. Douglas-fir/snowberry, Douglas-fir/ninebark and Douglas-fir/pinegrass are on westerly and easterly aspects and near draws. These habitat types have higher timber productivity than the major habitat types. Grassland plant communities are on ridge points and on steep southerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are sandy. Bedrock is within 20 to 40 inches of the surface.

Map Unit Composition

Ultic Haploxerolls are in about 60 percent of this map unit.

Rock outcrop occurs throughout and occupies about 20 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Lithic Ultic Haploxerolls are near rock outcrop and at ridge points. These soils have bedrock within 20 inches of the surface. Dystric Xerochrepts are on steep upper side slopes. These soils have thin dark-colored surface layers. These soils have lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Ultic Haploxerolls have a very dark brown sandy loam surface layer. This surface layer is about 12-inches thick. The subsoil is dark yellowish brown. The upper 6 inches are sandy loam, and the lower 8 inches are very cobbly loamy sand. The substratum is moderately well-weathered slowly permeable granitic rock at about 40 inches.

Management

Timber

Sampled stands have annual production of 34±6 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 200 pounds per acre per year of air-dry forage under a forest canopy to 450 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E2E—Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 2,200 to 5,600 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes are on southerly aspects with gradients of 50 to 80 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some Douglas-fir. Common understory plants are snowberry, arrowleaf balsamroot, common yarrow, mallow ninebark, creeping hollygrape, bluebunch wheatgrass, and creambush oceanspray.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/snowberry and ponderosa pine/mallow ninebark. Douglas-fir/mallow ninebark and Douglas-fir/pinegrass are included on lower slopes and near draws. These habitat types are in about 70 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Grassland plant communities are at ridge points and on upper slopes.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are loamy and have 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 60 percent of this map unit.

Rock outcrop occurs throughout and occupies about 20 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Typic Xerochrepts, loamy-skeletal, mixed, frigid, are associated with limestone. These soils have thin dark-colored surface layers. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near rock outcrop. These soils have bedrock within 20 inches of the surface. These soils have lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly silt loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have annual production of 34±6 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects limits forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 700 pounds per acre per year of air-dry forage under a forest canopy to 800 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E2J—Rock outcrop-Ultic Argixerolls complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 2,200 to 6,400 feet. Vegetation consists of open dry coniferous forest. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes are on southerly aspects with gradients of 60 to more than 100 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are very high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Water storage capacity is limited by bedrock at 20 to 40 inches, and runoff may occur.

Vegetation

Typical vegetation consists of open stands of ponderosa pine with some Douglas-fir. Common understory plants are snowberry, mallow ninebark, pinegrass, bluebunch wheatgrass, Sandberg bluegrass, common yarrow, and creeping hollygrape.

Habitat Type Composition and Distribution

The major habitat types are ponderosa pine/snowberry on side slopes and ponderosa pine/bluebunch wheatgrass at ridge points. Douglas-fir/mallow ninebark is included near draws. These habitat types are in about 40 percent of this map unit.

Highly dissimilar community types are in about 10 percent of this map unit. Grassland plant communities are on upper slopes on southerly aspects.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are loamy and have 60 to 80 percent rock fragments. Bedrock is within 20 to 40 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have subsoil clay accumulations. The similar soils are Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They do not have subsoil clay accumulations. These soils are in about 40 percent of this map unit.

Rock outcrop occurs on upper slopes and occupies about 50 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near rock outcrop. These soils have bedrock within 20 inches of the surface and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly loam overlying fractured bedrock at about 30 inches.

Management

Timber

Sampled stands have annual production of 34±6 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 300 pounds per acre per year of air-dry forage under a forest canopy to 500 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E32—Typic Dystrochrepts-Rock outcrop complex, dissected stream breaklands

This map unit is on extremely steep stream breaklands. Elevation ranges from 1,800 to 6,600 feet. Vegetation consists of mixed coniferous and dry mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 60 to more than 100 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order streams that originate near the top of the slope. The channel gradients are very high. The map unit is adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is limited by bedrock at 20 to 40 inches, and runoff may occur.

Vegetation

Typical vegetation on northerly aspects consists of mixed stands of Douglas-fir, ponderosa pine, grand fir, and western larch. Stands on southerly aspects are mixed Douglas-fir and ponderosa pine. Common understory plants on southerly aspects are' Lewis mockorange, brackenfern, creambush oceanspray, mallow ninebark, strawberry, and snowberry. On northerly aspects, common plants are blue huckleberry, beargrass, mountain maple, goldthread, northern twinflower, and mosses.

Habitat Type Composition and Distribution

This map unit is a complex of habitat type groups. The major habitat type on northerly aspects is grand fir/beargrass. Grand fir/queencup beadlily is included on lower slopes and in moist draws. These habitat types are in about 30 percent of this map unit.

The major habitat type on southerly aspects is grand fir/mallow ninebark. A similar habitat type is Douglas-fir/snowberry. These habitat types are in about 30 percent of this map unit.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 20 to 40 inches of the surface.

Map Unit Composition

Typic Dystrochrepts, sandy-skeletal, mixed, frigid, are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Lithic Dystrochrepts, sandy-skeletal, mixed, frigid, are near rock outcrop. These soils have bedrock within 20 inches of the surface and lower timber productivity than the dominant soils.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Typic Dystrochrepts, sandy-skeletal, mixed, frigid, have a brown to dark brown sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown very gravelly sandy loam about 10-inches thick. The substratum is brown to dark brown very stony sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have annual production of 52±2 cubic feet per acre per year. Map unit productivity is limited by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to ravel on steep cutbanks. Revegetation is difficult because this material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E38—Typic Dystrochrepts, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,600 to 6,400 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients that range from 60 to 90 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order streams that originate near the top of the slope. The channel gradients are high. The map unit is usually adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are included in frost pockets and above 4,000-feet elevation. Common understory plants are beargrass, snowberry, blue huckleberry, goldthread, mountain maple, mallow ninebark, western thimbleberry, white spiraea, and pinegrass.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges, upper side slopes, and southerly aspects and grand fir/queencup beadlily on lower slopes and northerly aspects. Similar habitat types are grand fir/twinflower and grand fir/wild ginger. Grand fir/blue huckleberry, Douglas-fir/mallow ninebark and grand

fir/mallow ninebark are included on ridges and steep southerly aspects. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are sandy.

Map Unit Composition

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have thick subsoils and 0 to 35 percent subsoil rock fragments. The similar soils are Typic Dystrochrepts, sandy-skeletal, mixed, frigid, or Typic Dystrochrepts, loamy-skeletal, mixed, frigid. They have thin subsoils or 35 to 60 percent subsoil rock fragments. These soils are in about 75 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 25 percent of this map unit. Typic Xerumbrepts, sandy-skeletal, mixed, frigid, are on steep southerly aspects. These soils have dark-colored surface layers, thin subsoils, and lower timber productivity than the dominant soils. Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid, are near draws and on northerly aspects. These soils have loess surface layers 14- to 18-inches thick and higher timber productivity than the dominant soils. Typic Haplumbrepts, loamy-skeletal, mixed, frigid, are in moist draws. These soils have dark-colored surface layers and fluctuating water tables. Rock outcrop occurs throughout this map unit.

Representative Profile

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are gravelly sandy loam. The substratum to a depth of 60 inches or more is brown to dark brown extremely gravelly sand.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E3F—Ultic Argixerolls, dissected stream breaklands, moist

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,800 to 6,600 feet. Vegetation consists of dry mixed coniferous forest. The lower soil layers formed in material derived from basalt and andesite.

Landform

The dominant slopes have gradients of 50 to 70 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of Douglas-fir and ponderosa pine. Grand fir and

western larch are included on northerly aspects and above 5,000-feet elevation. Engelmann spruce and lodgepole pine are included above 4,500-feet elevation. Common understory plants are snowberry, blue huckleberry, mallow ninebark, Saskatoon serviceberry, mountain maple, creambush oceanspray, creeping hollygrape, elk sedge, pinegrass, and Columbia brome.

Habitat Type Composition and Distribution

The major habitat types are Douglas-fir/mallow ninebark and grand fir/mallow ninebark on southerly aspects and below 4,000-feet elevation. Grand fir/twinflower and grand fir/blue huckleberry are included above 5,000-feet elevation and on northerly aspects at lower elevations. These habitat types are in about 80 percent of this map unit.

Dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have dark-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and have 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have dark-colored surface layers 7- to 20-inches thick and subsoil clay accumulations. The similar soils are Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid, or Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They have dark-colored surface layers 20- to 30-inches thick or do not have subsoil clay accumulations. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Dystric Xerochrepts, loamy-skeletal, mixed, frigid, are at ridge points. These soils have light-colored surface layers and lower timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a surface layer. This surface layer is about 12-inches thick. The upper 6 inches are very dark brown gravelly silt loam, and the lower 6 inches are dark brown gravelly loam. The subsoil is dark yellowish brown very gravelly clay loam about 16-inches thick. The substratum is dark yellowish brown extremely gravelly silt loam overlying fractured bedrock at about 51 inches.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration. Competition from understory vegetation also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Unsurfaced roads are slick when wet. Material exposed by road construction is difficult to revegetate because of moisture stress.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 400 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E48—Typic Dystrochrepts-Typic Vitrandepts complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 1,400 to 5,800 feet. Vegetation consists of moist mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes are on northerly aspects with gradients of 60 to 90 percent. Dissected stream

breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is adjacent to larger-order streams, and stream order jumping is common. Seeps and springs are common at stream heads and on lower slopes. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of western red cedar, grand fir, Douglas-fir, and western larch. Engelmann spruce is included in frost pockets and above 4,000-feet elevation. Common understory plants are Pacific yew, mountain maple, snowberry, Utah honeysuckle, myrtle pachystima, blue huckleberry, queencup beadlily, goldthread, sword hollyfern, wild ginger, and Pacific trillium. Shrubs increase when the canopy is removed.

Habitat Type Composition and Distribution

The major habitat types on northerly aspects and mid to lower slopes are western red cedar/queencup beadlily and western red cedar/wild ginger. Grand fir/queencup beadlily is included on steep upper side slopes and ridges. Grand fir/wild ginger is also included. These habitat types are in about 75 percent of this map unit.

Highly dissimilar habitat types are in about 25 percent of this map unit. Douglas-fir/mallow ninebark is on steep southerly aspects. This habitat type has lower timber productivity than the major habitat types. Western red cedar/ladyfern, western red cedar/maidenhair fern, and grand fir/arrowleaf groundsel are in moist draws and on toeslopes. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with aspect and slope position. Soils on southerly aspects and upper slopes have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soils on northerly aspects and lower slopes have volcanic ash-influenced loess surface layers 14- to 20-inches thick.

Map Unit Composition

Typic Dystrochrepts, coarse-loamy, mixed, frigid, are on southerly aspects. These soils have 0 to 35 percent subsoil rock fragments and thick subsoils. The similar soils are Typic Dystrochrepts, loamy-skeletal, mixed, frigid, or Typic Dystrochrepts, sandy, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or thin subsoils. These soils are in about 50 percent of this map unit.

Typic Vitrandepts, medial over loamy, mixed, frigid, are on northerly aspects. These soils have 0 to 35 percent subsoil rock fragments and thick subsoils. The similar soils are Typic Vitrandepts, medial over loamy-skeletal, mixed, frigid, or Typic Vitrandepts, medial over sandy or sandy-skeletal, mixed, frigid. They have 35 to 60 percent subsoil rock fragments or thin subsoils. These soils are in about 35 percent of this map unit.

Dissimilar soils make up about 15 percent of this map unit. Umbric Vitrandepts, medial over loamy, mixed, frigid, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Typic Dystrochrepts, coarse-loamy, mixed, frigid, have a brown to dark brown loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are loam, and the lower 24 inches are sandy loam. The substratum to a depth of 60 inches or more is brown gravelly loamy sand.

Typic Vitrandepts, medial over loamy, mixed, frigid, have a silt loam surface layer. This surface layer is about 15-inches thick. The upper 5 inches are very dark grayish brown, and the lower 10 inches are brown to dark brown. The subsoil is brown to dark brown gravelly coarse sandy loam about 22-inches thick. The substratum to a depth of 60 inches or more is light brownish gray sandy loam and light yellowish brown gravelly loamy coarse sand.

Management

Timber

Sampled stands have an annual production of 75±17 cubic feet per acre per year. Site productivity is highly dependent on loess surface layers on northerly aspects. Tractor operation may lower productivity by compacting or displacing loess surface layers or by mixing loess surface layers with subsoil material. Steepness of slope limits tractor operation. Competition from understory vegetation limits forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to slough, erode, and ravel on steep cutbanks.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on southerly aspects and slight hazards of erosion on northerly aspects. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E67—Dystric Cryochrepts-Rock outcrop complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 5,200 to 7,200 feet. Vegetation consists of subalpine forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 60 to 80 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The subsurface water storage capacity is moderate. The regolith water storage capacity is limited by bedrock at 40 to 60 inches, and runoff may occur.

Vegetation

Typical vegetation consists of stands of subalpine fir, lodgepole pine, and Engelmann spruce. Douglas-fir is included at lower elevations; whitebark pine is included at higher elevations. Common understory plants are beargrass, grouse whortleberry, blue huckleberry, and elk sedge.

Habitat Type Composition and Distribution

The major habitat types are subalpine fir/beargrass on upper slopes and southerly aspects and subalpine fir/menziesia near draws and on lower slopes. A similar habitat type below 6,000-feet elevation is grand fir/beargrass. These habitat types are in about 50 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Subalpine fir/woodrush is on ridges above 6,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Subalpine fir/twisted stalk is in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 30 percent of this map unit.

Dissimilar soils make up about 20 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are on northerly aspects and lower slopes. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Typic Cryumbrepts, sandy-skeletal, mixed, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown extremely cobbly loamy sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of about 37±5 cubic feet per acre per year. Map unit productivity is reduced by rock outcrop. Steepness of slope and rock outcrop limit tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems. The snow cover, which commonly lasts from early fall to late spring, limits use of this map unit for livestock grazing.

Watershed

Line skidding corridors, firelines, and the material exposed by road construction have severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61E8B—Dystric Cryochrepts-Typic Cryandepts complex, dissected stream breaklands

This map unit is on very steep dissected stream breaklands. Elevation ranges from 4,000 to 6,600 feet. Vegetation consists of a mosaic of cold mixed coniferous forest and moist forest openings. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 60 to 80 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is often adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation in forest stands is grand fir, subalpine fir, and Engelmann spruce. Lodgepole pine and Douglas-fir are included on upper side slopes. Common understory plants are blue huckleberry, menziesia, Pacific yew, queencup beadlily, and goldthread. Common plants in forest openings are Sitka alder, mountain maple, menziesia, willow, mountain red elderberry, blue huckleberry, western coneflower, brackenfern, wild ginger, queencup beadlily, arrowleaf groundsel, and baneberry.

Habitat Type Composition and Distribution

About 60 percent of this map unit is forested. The major habitat type is grand fir/queencup beadlily. A similar habitat type at lower elevations and in depressions is grand fir/wild ginger. Subalpine fir/menziesia is included on northerly aspects at elevations above 5,800 feet, and subalpine fir/beargrass is included on ridges. These habitat types are in about 90 percent of forest stands.

The major community types in moist draws and depressions contain alder and forbs. These community types are in about 30 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest

regeneration. Western red cedar/wild ginger and western red cedar/queencup beadlily are in the Selway River drainageway. These habitat types have higher timber productivity than the major habitat type.

Characteristics of the Soils

Soil substrata are sandy. Soil properties vary with vegetation. Soils under forest stands have light-colored surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Bedrock is within 40 to 60 inches of the surface. Soils in forest openings have dark-colored surface layers formed in volcanic ash-influenced loess 14- to 20-inches thick.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, are under forest stands. These soils have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 45 percent of this map unit.

Typic Cryandepts, medial over loamy-skeletal, mixed, are in forest openings. They have loess surface layers 14- to 20-inches thick. The similar soils are Typic Cryumbrepts, loamy-skeletal, mixed, or Andic Cryumbrepts, loamy-skeletal, mixed. They have loess surface layers mixed with subsoil material or loess surface layers 10- to 14-inches thick. These soils are in about 30 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 25 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, are under forest stands. These soils have light-colored surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Andic Cryaquepts, loamy-skeletal, mixed, are in wet depressions and moist draws. These soils have mottled or gleyed subsoils and fluctuating water tables.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profiles

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly loamy sand and light yellowish brown very gravelly loamy sand overlying bedrock at about 40 inches.

Typic Cryandepts, medial over loamy-skeletal, mixed, have a silt loam surface layer. This surface layer is about 19-inches thick. The upper 8 inches are very dark brown, and the lower 11 inches are dark brown. The subsoil is brown to dark brown very gravelly sandy loam about 22-inches thick. The substratum to a depth of 60 inches or more is dark brown to brown very gravelly loamy sand.

Management

Timber

Sampled stands have an annual production of 43±7 cubic feet per acre per year in forest stands. Map unit productivity is reduced by moist forest openings. Steepness of slope limits tractor operation. Observations indicate limitations to forest regeneration may be expected adjacent to moist forest openings. Competition from understory vegetation also limits forest regeneration.

Roads

This map unit contains some wet soils that limit road location and construction. Excavation may intercept large amounts of ground water in moist draws and wet depressions. Because of wet soils with low strength, roads require suitable subgrade material across moist draws and depressions. In moist draws, cutbanks tend to slough and unsurfaced roads rut and erode when wet. Hard rock on side slopes and ridges occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction on side slopes and ridges tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production on side slopes ranges from 100 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. The potential native plant community in moist forest openings produces about 500 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems. Grazing of moist draws and depressions should be delayed until the soil is firm enough to withstand trampling by livestock.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion on side slopes and ridges. The material exposed by road construction has severe hazards of erosion on side slopes and ridges. Excavation for road construction and ruts caused by equipment operation may intercept ground water in moist draws and depressions. Intercepted

ground water may erode road ditches and cause gullying of ruts. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Moist draws and wet depressions are riparian areas. They are in about 30 percent of this map unit. Conservation practices to protect riparian values may be required when managing adjacent uplands.

61EH7—Dystric Cryochrepts, dissected stream breaklands, warm

This map unit is on very steep dissected stream breaklands. Elevation ranges from 4,200 to 7,200 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 60 to 80 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is usually adjacent to larger-order streams, and stream order jumping is common. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, subalpine fir, Douglas-fir, western larch, Engelmann spruce, and lodgepole pine. Common understory plants are beargrass, blue huckleberry, goldthread, northern twinflower, prince's pine, menziesia, and queencup beadlily.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on ridges and southerly aspects and grand fir/queencup beadlily on lower slopes on northerly aspects. Subalpine fir/menziesia is included near draws and above 5,800-feet elevation on northerly aspects. Subalpine fir/beargrass is included on southerly aspects above 6,000-feet elevation. These habitat types are in about 80 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. Soil substrata are sandy. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, sandy-skeletal, mixed, have thin subsoils. The similar soils are Dystric Cryochrepts, loamy-skeletal, mixed. They have thick subsoils. These soils are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Andic Cryochrepts, sandy-skeletal, mixed, and Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, are on northerly aspects in depressions and on lower slopes. These soils have loess surface layers 7- to 20-inches thick and higher timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Dystric Cryochrepts, sandy-skeletal, mixed, have a brown to dark brown gravelly sandy loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly sandy loam about 12-inches thick. The substratum is yellowish brown extremely gravelly sand and light yellowish brown very cobbly sand overlying bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. On southerly aspects, revegetation is difficult because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas.

Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61EHP—Dystric Cryochrepts, dissected stream breaklands, andesite substratum

This map unit is on very steep dissected stream breaklands. Elevation ranges from 4,600 to 8,200 feet. Vegetation consists of cold mixed coniferous forest. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes have gradients of 50 to 70 percent. Dissected stream breaklands have narrow ridges, straight to slightly concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of parallel first-order drainageways that originate near the top of the slope. The channel gradients are high. The map unit is sometimes adjacent to larger-order streams, and stream order jumping is common. Water storage capacity in fractured bedrock is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Engelmann spruce, and Douglas-fir. Subalpine fir is included above 6,500-feet elevation. Common understory plants are blue huckleberry, beargrass, western meadowrue, elk sedge, and mosses.

Habitat Type Composition and Distribution

The major habitat types are grand fir/blue huckleberry below 6,200-feet elevation and grand fir/beargrass above 6,200-feet elevation. A similar habitat type above 6,200 feet is subalpine fir/blue huckleberry. Grand fir/twinflower, subalpine fir/beargrass, and Douglas-fir/mallow ninebark are included. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Whitebark pine/subalpine fir is on ridges above 7,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are loamy and contain 60 to 80 percent rock fragments. Bedrock is within 40 to 60 inches of the surface.

Map Unit Composition

Dystric Cryochrepts, loamy-skeletal, mixed, are in about 80 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 20 percent of this map unit. Typic Cryumbrepts are in moist draws and on ridges under open-grown forest. These soils have dark-colored surface layers. In moist draws, these soils have fluctuating water tables that limit forest regeneration. On ridges, these soils have lower timber productivity than the dominant soils. Rock outcrop occurs throughout this map unit.

Representative Profile

Dystric Cryochrepts, loamy-skeletal, mixed, have a brown to dark brown gravelly silt loam surface layer. This surface layer is about 7-inches thick. The subsoil is brown very gravelly silt loam about 12-inches thick. The substratum is yellowish brown and light yellowish brown extremely cobbly silt loam overlying fractured bedrock at about 40 inches.

Management

Timber

Sampled stands have an annual production of 51±3 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress may limit forest regeneration. Solar insolation on southerly aspects also limits forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

Forest understory forage production ranges from about 100 pounds per acre per year of air-dry forage under a forest canopy to 300 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has slight hazards of erosion. A moderate percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

61ENZ—Rock outcrop

This map unit, mostly exposures of bare bedrock, is on extremely steep dissected stream breaklands. Shallow or extremely stony soils are included near draws and on colluvial toeslopes. Included soils may support either forest or grassland.

This map unit is not suitable for most land uses.

63E1J—Lithic Ultic Argixerolls-Rock outcrop complex, breakland drainageway heads

This map unit is on breakland drainageway heads. Elevation ranges from 3,600 to 6,400 feet. Vegetation consists of grassland. The lower soil layers formed in material derived from andesite and basalt.

Landform

The dominant slopes have gradients of 50 to 80 percent. Breakland drainageway heads have narrow ridges, vertically and laterally concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of first-order drainageways that converge downslope. The channel gradients are high. The regolith water storage capacity is limited by bedrock at 5 to 20 inches, and runoff may occur.

Vegetation

Typical vegetation consists of sparse stands of bluebunch wheatgrass, rattlesnake brome, cheatgrass, common yarrow, and creeping hollygrape. Big sage and mountain mahogany are near rock outcrop.

Habitat Type Composition and Distribution

Plant communities are comparable to bluebunch wheatgrass/Sandberg bluegrass habitat type. A similar community type is comparable to Idaho fescue/bluebunch wheatgrass habitat type. These community types are in about 50 percent of this map unit.

Highly dissimilar habitat types are in about 10 percent of this map unit. Ponderosa pine/snowberry is near draws.

Characteristics of the Soils

The major soils have dark-colored surface layers and bedrock within 20 inches of the surface.

Map Unit Composition

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, have subsoil clay accumulations. The similar soils are Lithic Ultic Haploxerolls, loamy-skeletal, mixed, frigid. They do not have subsoil clay accumulations. These soils are in about 50 percent of this map unit.

Rock outcrop occurs throughout and occupies about 40 percent of this map unit.

Dissimilar soils make up about 10 percent of this map unit. Ultic Argixerolls, loamy-skeletal, mixed, frigid, are near draws. These soils have bedrock 20 to 30 inches deep and higher forage productivity.

The components of this map unit are so intricately mixed that it was not practical to map them separately at the scale used.

Representative Profile

Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, have a very dark brown gravelly silt loam surface layer. This surface layer is about 9-inches thick. The subsoil is dark brown very cobbly silty clay loam overlying fractured bedrock at about 12 inches.

Management

Timber

This map unit contains only scattered stands of trees and is poorly suited to timber management.

Roads

Hard rock frequently limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Unsurfaced roads are rough and difficult to blade because of large stones in areas. Large stones may roll from cutslopes onto road surfaces causing a driving hazard.

Range

The potential native plant community produces about 200 pounds per acre per year of air-dry forage. Steep slopes may cause livestock distribution problems.

Watershed

Firelines have severe hazards of erosion. The material exposed by road construction has slight hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

63E38—Typic Dystrochrepts, breakland drainageway heads

This map unit is on breakland drainageway heads. Elevation ranges from 3,400 to 6,500 feet. Vegetation consists of mixed coniferous forest. The lower soil layers formed in material derived from granitic rocks.

Landform

The dominant slopes have gradients of 45 to 80 percent. Breakland drainageway heads have narrow ridges, vertically and laterally concave side slopes, and shallow V-shaped draw bottoms.

The drainage pattern consists of a dense pattern of first-order drainageways that converge downslope. The channel gradients are high. The regolith water storage capacity is high, and runoff is rare.

Vegetation

Typical vegetation consists of mixed stands of grand fir, Douglas-fir, western larch, and ponderosa pine. Engelmann spruce and lodgepole pine are included above 4,500-feet elevation. Common understory plants are beargrass, snowberry, blue huckleberry, goldthread, mountain maple, mallow ninebark, western thimbleberry, and white spiraea.

Habitat Type Composition and Distribution

The major habitat types are grand fir/beargrass on southerly aspects and grand fir/queencup beadlily on northerly aspects. A similar habitat type on ridges and southerly aspects is grand fir/blue huckleberry. Douglas-fir/mallow ninebark is included on steep southerly aspects. Western red cedar/queencup beadlily is included in a few delineations in the Selway River drainageway. These habitat types are in about 70 percent of this map unit.

Highly dissimilar habitat types are in about 20 percent of this map unit. Subalpine fir/menziesia is on northerly aspects above 6,000-feet elevation. This habitat type has lower timber productivity than the major habitat types. Grand fir/arrowleaf groundsel and subalpine fir/twisted stalk are in moist draws. Fluctuating water tables limit forest regeneration.

Characteristics of the Soils

The major soils have surface layers formed in volcanic ash-influenced loess mixed with subsoil material. The substrata are sandy.

Map Unit Composition

Typic Dystrochrepts, loamy-skeletal, mixed, frigid, have thick subsoils. The similar soils are Typic Dystrochrepts, sandy-skeletal, mixed, frigid. They have thin subsoils. These soils are in about 75 percent of this map unit.

Up to 10 percent of this map unit is rock outcrop.

Dissimilar soils and rock outcrop make up about 25 percent of this map unit. Andic Dystrochrepts, loamy-skeletal, mixed, frigid, are on northerly aspects. These soils have loess surface layers 7- to 14-inches thick and higher timber productivity than the dominant soils. Andic Haplumbrepts, loamy-skeletal, mixed, frigid, are in moist draws. These soils have dark-colored surface layers. Fluctuating water tables limit forest regeneration. Rock outcrop occurs throughout this map unit.

Representative Profile

Typic Dystrochrepts, loamy-skeletal, mixed, frigid, have a brown to dark brown loam surface layer. This

surface layer is about 7-inches thick. The subsoil is brown to dark brown. The upper 10 inches are gravelly loam, and the lower 24 inches are very gravelly sandy loam. The substratum to a depth of 60 inches or more is brown extremely gravelly sand.

Management

Timber

Sampled stands have an annual production of 52±2 cubic feet per acre per year. Steepness of slope limits tractor operation. Moisture stress and solar insolation on southerly aspects limit forest regeneration.

Roads

Hard rock occasionally limits excavation. Steepness of slope increases the quantity of material excavated. Material exposed by road construction tends to erode and ravel on steep cutbanks. Revegetation is difficult because the material is sandy, infertile, and droughty.

Range

Forest understory forage production ranges from about 50 pounds per acre per year of air-dry forage under a forest canopy to 200 pounds per acre per year when the canopy is removed. Steep slopes may cause livestock distribution problems.

Watershed

Line skidding corridors and firelines have moderate hazards of erosion. The material exposed by road construction has severe hazards of erosion. A high percentage of roads constructed in this map unit are close enough to drainageway channels to be a source of sediment.

Riparian Areas

Riparian areas are small and unlikely to significantly affect the management of adjacent uplands.

Use and Management of the Soils

Following is a description of the use and management of the soils within the survey area. Soil, landform, geology, and vegetation properties that influence the productivity and suitability of the land for a variety of resource uses are described. The criteria utilized in developing interpretations for the detailed soil map units of the survey area also are presented.

Timber

Nez Perce National Forest employees: Roger Ward, Forest Silviculturist; Neal Forester, Forest Timber Planner; Dick Artley, Logging Systems Engineer; and Rich Kennedy, Geotechnical Engineer, helped to prepare this section.

Approximately 89 percent of the survey area is forested. The principal commercial species are ponderosa pine, grand fir, western red cedar, western larch, Douglas-fir, lodgepole pine, Engelmann spruce, and subalpine fir. The amount of timber harvested and offered for sale during the last 20 years has ranged from 75- to 130-million board feet annually. The average is 102-million board feet per year.

Forest soils have permeable surface layers with low bulk density. Logging, slash piling, and site preparation with tractors can mix, compact, and rearrange soil surface layers, thereby reducing productivity and causing erosion (Gracean, 1980). Tractor operation should be carefully planned to minimize the area affected.

Timber Management and Productivity

Table 4 can be used by forest managers in planning the use of soils for the production of wood products. Only those map units that have a forested component are listed in the table.

Tractor Operation gives limitations to the operation of rubber-tired or tracked vehicles on the soils. The limitations are wetness, slopes or complex slopes, and soil damage.

Wetness is a limitation to tractor operation in map units that include poorly drained or somewhat poorly drained soils. The operation of tractors in areas of these soils can result in soil rutting and puddling. Map units with this limitation have a soil with a fluctuating water table.

The slope is a limitation to tractor operation in map units that have slopes greater than 45 percent. Steep slopes can make tractor operation unsafe. Tractor operation on steep slopes also may cause excessive mixing and displacement of soil surface layers and thus reduce soil productivity. Tractor operation is limited by the steepness of slope on all but included small areas of less steep slopes. Cable logging systems can overcome this limitation. Complex slopes are a limitation in map units that contain slopes of 25 to 50 percent mixed with those that do not. Combinations of tractor and cable logging can overcome this limitation.

Soil damage is a limitation to tractor operation on soils with surface layers of loess that has been influenced by volcanic ash and that are not mixed with subsoil material. These surface layers have very favorable properties for tree growth. Tractor operation can compact, displace, or mix surface layers with subsoil material and thus reduce soil productivity.

The column, *Regeneration*, gives limitations to forest regeneration of cutover or burned areas. The limitations in the survey area are soil wetness, moist openings, frost pockets, competition, moisture stress, insolation, and a harsh climate.

Soil wetness is a limitation to regeneration in map units with fluctuating water tables that rise following timber harvest and thus limit regeneration.

Moist openings are shrub or forb plant communities indicating higher than normal moisture. The soils in openings and under adjacent forest have dark-colored surface layers. Although the cause is not yet understood, forest regeneration is limited in soils adjacent to openings. Unusually high levels of gopher activity are associated with these soils.

Frost pockets are low-lying areas where cold air drainage accumulates at night. Frequent frosts during the growing season limit species adaptation and regeneration. This limitation to forest regeneration is associated with stream bottoms and moist draws and depressions. This limitation is also associated with

draw bottoms in rolling uplands or moraines when the surrounding uplands are subalpine fir series habitat types.

Competition is a limitation to forest regeneration resulting from aggressive understory species invading openings in the forest canopy. This limitation is associated with moist mixed coniferous and dry mixed coniferous forests.

Moisture stress is a limitation to forest regeneration associated with open dry and dry mixed coniferous forests, on southerly aspects with grand fir/beargrass and subalpine fir/beargrass habitat types, and with lodgepole pine/beargrass community types in other vegetative groups.

Insolation, or exposure to sunlight, limits forest regeneration on steep southerly aspects. Summer surface soil temperature in unshaded areas can be lethal to seedlings. This limitation is associated with slopes steeper than 45 percent on southerly aspects.

A harsh climate is a limitation to forest regeneration caused by short growing seasons, persistent snowbanks, and exposure to wind in open areas. This limitation is associated with open subalpine forest and elevations above 7,000 feet.

Erosion Hazard gives the hazard of erosion for skid trails, firelines, and similar types of soil disturbance associated with logging and site preparation practices. The hazards are relative to other map units in the survey area. The rating can be used to evaluate the need for erosion-control practices and to compare hazards on alternative areas. Thickness of loess surface layers, steepness of slope, permeability, habitat types, and soil drainage are properties used to rate the hazard of erosion. Map units rated *slight* have loess surface layers more than 7-inches thick, moderate to rapid permeability, well-drained soils, and are other than open subalpine forest. Map units rated *moderate* have either thin or mixed loess surface layers, moderately slow or slow permeability, or open subalpine forest on dominant slopes of 0 to 45 percent. Map units rated *severe* have either a fluctuating water table or open subalpine forest on dominant slopes of 45 to 70 percent.

Non-forest is the percentage of map unit delineation area usually occupied by forest openings, meadows, rock outcrop, grassland, or grassy balds. Map unit timber productivity is reduced in proportion to non-forest components.

A *Forest Vegetative Group* is a group of habitat types with broadly similar properties. Vegetative groups have relatively narrow ranges of timber productivity and similar limitations to regeneration. The groups are described under *Vegetation* in the "General Nature of the Survey Area" section.

Production is measured in cubic feet per acre per year. Production is the mean annual volume growth and 95-percent confidence interval of the forested component of map units and is dependent on stand age, stocking, condition, and site productivity. Stands 50- to 140-years old were measured.

Basal Area is the mean cross-sectional area in square feet per acre and 95-percent confidence interval of all trees in a stand taken at a height of 4.5 feet. Basal area is dependent on stand age, stocking and condition. Stands 100- to 200-years old were used to measure basal area.

Common Trees are the main trees present in natural stands. Other trees are sometimes adapted, but site-specific evaluation is recommended to confirm adaptation. Blister rust-resistant varieties of white pine are usually adapted to moist mixed coniferous forest.

Site Index is the height in feet and 95 percent confidence interval of dominant and codominant trees at 50 years of age. Site index is relatively independent of stand age and stocking levels.

Roads

Rich Kennedy, Geotechnical Engineer, Nez Perce National Forest, helped to prepare this section.

Road construction is the primary engineering use of the soils in forest management. Approximately 3 to 4 miles of road are required to place 1 square mile of timber under management. Several standards of roads are constructed in the survey area. Arterial or collector roads are normally 12-feet wide with ditch or 14-feet wide with rolling grade or outsloping for drainage. Local logging roads generally are drained by rolling grades, water bars, or outsloping. Local roads are often closed when not needed for hauling logs. Roads generally are unsurfaced.

Data in this section can be used for choosing among alternative road locations and designs. Land use planners can use this data to evaluate feasibility of allocating land to uses requiring roads. Transportation planners can use this to evaluate alternative routes. Design engineers can use it to plan detailed on-site investigations of soil and geology. This information does not eliminate the need for on-site investigation and testing.

Engineering Properties and Classification

Table 5 gives estimates of the engineering properties and classification for material on road cutbanks and in road fills. For most map units, the material rated is the lowest soil layer at about 40 to 60 inches. The upper parts of the subsoil at about 20 to 40 inches are rated when the dominant map unit slope is less than 15 percent. Road construction on these units requires only minor excavation. The estimates can be used in planning on-site investigations prior to the design and construction of roads.

USDA Texture for road cutslope is the dominant texture for the greater portion of the cutslope area for these map units. Soil texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined in terms of sand, silt, and clay percentages in the fraction of soil that is less than 2 millimeters in diameter. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Unified Classification is the classification of the soils is given according to the Unified Soil Classification System (ASTM, 1993). This system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, 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 are identified as ML, CL, OL, MH, CH, and OH. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SW-SM.

Rock Fragments >3 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 Passing Sieves is the percentage of the soil fraction less than 3 inches in diameter based on oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.425, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area 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 and on field examination.

Features Affecting Road Construction Costs

Table 6 gives map unit features that affect the cost of road construction. These features can be used to estimate the relative cost of road construction on alternative locations.

Slope Range is the percentage range of slopes within the map unit. Small areas of slopes outside the given range may be included. The steepness of slope affects the quantity of material that must be excavated.

The percent of *Hard Bedrock* can be used to estimate difficulty of excavation. The percentage is estimated based on observations of road cutslopes in the survey area and the association of landform, rock outcrop, geologic group, and vegetative group with the presence of massive bedrock.

Map units with less than 10 percent bedrock within the excavated depth have one of the following sets of properties: slopes are less than 45 percent and bedrock is not basalt or andesite; or, slopes are 45 to 60 percent, bedrock is granitic rocks, and the vegetation is moist mixed coniferous forest. Map units with 10 to 50 percent bedrock within excavated depth do not have a named rock outcrop or shallow soil component. These units have one of the following sets of properties: dominant slopes greater than 45 percent; the underlying bedrock is basalt or andesite; or dominant slopes greater than 60 percent, underlying bedrock is granitic rocks, and the vegetative group is moist mixed forest. Map units with more than 50 percent bedrock within excavated depth have a named rock outcrop or shallow soil component.

Drainage Crossings Per 1,000 Feet can be used to estimate the average number of drainage structures required. The number of drainage crossings per 1,000 feet are estimated for the upper, middle, and lower slopes in the map unit. Estimates are based on distance between drainage channels measured on aerial photographs.

Road Construction and Maintenance

Table 7 shows for each map unit the types of limitations to road construction and maintenance. This information can be used to compare construction and maintenance limitations on alternative road locations and in planning detailed on-site investigations.

Excavation is limited by steep slopes, bedrock within the excavated depth, and wet areas. Map units

with dominant slopes of 60 to 90 percent were given a slope limitation. The percentage of bedrock in map units is given in Table 6. Wet areas may limit the period when excavation can be made. The soils may also have low strength and require that suitable subgrade material be added.

Cut and Fill Maintenance gives limitations to maintenance of road cutbanks. Slough and ravel limit cutbank maintenance. Cutbank slough is associated with ground water intercepted by excavation. Map units with dominant slopes greater than 15 percent are given this limitation when they contain seeps or springs or soil layers that restrict permeability. Compact glacial till, or subsoils, containing 35 to 50 percent clay is considered restrictive. Cutbank ravel is associated with friable, moderately coarse-textured or coarse-textured material containing rounded or subrounded rock fragments or laminated shale bedrock. Map units are given this limitation when dominant slopes are steeper than 15 percent and soil substrata are sand to sandy loam texture with rounded or subrounded rock fragments or the soil is underlain by laminated shale bedrock. Avalanches are associated with glacial cirque headwalls or glacial trough walls. Avalanches can damage road fills and deposit debris on road surfaces.

Native Road Surface shows limitations of fill material for use as road surface. The limitations are large stones that form a rough surface that is difficult to blade, the formation of ruts, and the slipperiness of the soil material when it is wet. Large stones are associated with very or extremely cobbly or stony substrata and with shallow soils on which road surfaces are mainly excavated bedrock. The formation of ruts is associated with soils that are medium textured or moderately fine textured in the lower part of the profile and that have a 0 to 35 percent content of rock fragments in the subsoil. Slippery surfaces are associated with lower soil layers that have plastic fines and more than 60 percent rock fragments less than 3 inches in diameter.

Revegetation shows limitations to establishing grasses and legumes on road cutslopes and fill slopes. Road cutslopes and fill slopes commonly are seeded to control erosion and improve appearance. Revegetation is limited by moisture stress, infertile and droughty material, and unstable cutslopes. Moisture stress is associated with grasslands, open dry coniferous forest, dry mixed coniferous forest, and southerly aspects with grand fir/beargrass or subalpine fir/beargrass habitat types and lodgepole pine/beargrass community types in other vegetative groups. This vegetation is associated with climates that normally receive little summer rainfall. Seeding mixtures should contain species that are tolerant of summer drought. Infertile and droughty materials are associated with sandy lower soil layers or weathered granitic rocks. Weathered granitic rocks rapidly break down into a mixture of pea-sized gravel and coarse sand when exposed by road construction. Cutslopes formed in these materials tend to ravel. Mulch, topsoil, or shrubs may improve revegetation success.

Range

Tim Schommer, Forest Range Conservationist, Nez Perce National Forest, helped to prepare this section.

The survey area provides summer range for livestock from adjoining farms and ranches. Approximately 42,000 Animal Unit Months (AUM) of grazing are on the survey area. Most of the livestock are cattle, but there are a few bands of sheep. The grazing season generally begins in early June and ends in mid-October, but it varies with elevation. Most ranges contain mountain grasslands, shrublands, and meadows. Open-grown forests with bunchgrass understories also provide important range. Densely forested areas can be used as transitory range following timber harvest or forest fires. Removal of the forest canopy may stimulate understory forage production. Production on transitory ranges peaks about 10 years after canopy removal and then declines as the forest regenerates and the canopy closes.

Range Management and Productivity

Table 8 gives limitations to livestock grazing and herbage and forage productivity. This table can be used by range managers to determine suitability for livestock grazing. On-site investigation is required for planning the use of individual livestock ranges because of the need to determine the composition and vigor of existing vegetation.

Livestock Grazing Limitations gives the degree and kind of limitations to livestock grazing. The slope, trampling damage, and a short season can limit grazing. Slopes greater than 30 percent can limit livestock access to forage.

Trampling damage is considered a limitation when the soils have fluctuating water tables. Grazing when soils are wet can damage both the soils and vegetation. Grazing should be delayed until soils are firm enough to withstand trampling damage. A short season is associated with subalpine forest, open

subalpine forest, and grassy balds. Snowcover from early fall to late spring limits grazing seasons.

The *Vegetative Group* is a group of habitat or community types with broadly similar properties. Vegetative groups have relatively narrow ranges of forage productivity. The groups are described under *Vegetation* in the "General Nature of the Survey Area" section.

Estimated Forage Productivity gives the total herbage and forage production in an average year under the forest canopy and after canopy removal on forested sites and in grasslands and meadows. Total herbage production is expressed in pounds of air-dry growth per year regardless of palatability to livestock. The production includes the current year's growth of leaves, twigs, and fruits of woody plants. Usable forage is the herbage production palatable to livestock. Productivity and palatability are based on production and utilization studies conducted by the Forest Service on the Nez Perce National Forest.

Watershed

The survey area is in the Columbia River Basin. The average annual water yield is about 1.8-million acre-feet. Streams within the survey area contain about 8,900 acres of steelhead trout and spring Chinook spawning and rearing habitat. Maintenance of this habitat potential is dependent on the quality of watershed management in the survey area. The survey area also contains an additional 1,000 miles of streams with other game fish habitat.

Many soils in the survey area have subsoils and substrata formed in material derived from well-weathered or moderately well-weathered granitic rocks and associated gneiss and schist. These materials are very erodible when exposed. Eroded material moves rapidly through steep, high-energy tributary streams to larger streams containing fish habitat. This sediment can cause channel erosion; flooding; and damage to bridges, culverts, and reservoirs. The sediment can also cause damage to fish habitat when deposited in lower-gradient streams. Roads are the principal source of management-induced sediment in the survey area (Megahan, 1984).

Sediment from Roads

Table 9 gives the relative hazards for erosion, cutbank slough and ravel on roads, and the percentage of roads likely to contribute sediment to streams.

Hazard of Erosion gives the relative erosion hazard for roads. The hazard is for lower soil layers exposed on cutslopes, fills, and native road surfaces. The hazards are based on observations of erosion within the survey area and the association of erosion with lower soil layer properties. Texture, rock fragment content, and drainage were used to evaluate erosion hazard. The map units rated *slight* have loamy lower soil layers with 60 to 80 percent rock fragments, and the soils are well drained. The map units rated *moderate* have loamy lower soil layers with 0 to 60 percent rock fragments, and the soils are well drained. The map units rated *severe* have sandy lower soil layers, and the soils are well drained. Map units rated *very severe* have one of the following sets of properties: lower soil layers form in weathered granitic rock that breaks down to fine gravel and coarse sand when exposed, and the soils are well drained (ASTM, 1993); or the soils have fluctuating water tables and ground water is intercepted by excavation (Cooper, 1987).

Cutbank Slough gives the relative cutbank slough hazard for roads. The hazard is for lower soil layers exposed on cutbanks. The hazards are based on observations of road cutbank sloughing within the survey area and the association of sloughing with certain soil properties. Sloughing is associated with fluctuating water tables, slowly permeable subsoils that perch water, steep slopes supporting moist mixed forest, or lower soil layers formed in glacial till. Map units rated *slight* have well-drained soils, subsoils are moderately or rapidly permeable, slopes are less than 60 percent, and lower soil layers are not formed in glacial till. Map units rated *moderate* have lower soil layers formed in glacial till. Map units rated *severe* have one of the following sets of properties: soils have fluctuating water tables; soils have slowly permeable subsoils; or dominant slope gradients are 60 to more than 100 percent, and vegetation is moist mixed coniferous forest.

Cutbank Ravel gives the relative cutbank ravel hazard for roads. The hazard is for lower soil layers exposed on cutbanks. The hazards are based on observations of cutbank ravel within the survey area and the association of ravel with lower soil layer properties. Ravel is associated with moderately coarse-textured and coarse-textured lower soil layers or with lower soil layers formed in weathered granitic rocks that break down into coarse sand and fine gravel when exposed. Map units rated *slight* have medium-textured or moderately fine-textured lower soil layers. Map units rated *moderate* have moderately coarse-textured or coarse-textured lower

soil layers. Map units rated *severe* have lower soil layers formed in weathered granitic rocks.

The *Sediment-Contributing Area* is the percentage of road length from which sediment is likely to reach a stream. This area is displayed for three potential road positions on the landscape: upper slope, middle slope, and lower slope. This percentage can be used to evaluate the relative hazard to water quality for alternative road locations and to estimate the portion of a road where sediment-control practices are most effectively applied. The area of road segment that would be in sediment-contributing areas is calculated by multiplying the road prism dimensions by this percentage. The rating considers the number of drainage channels, the distance of the road from drainage channels, and the slope gradient. The ratings assume that roads cross drainageways and do not parallel them. The ratings also assume that any sediment discharged on slopes of less than 16 percent has a high probability of contributing to stream sedimentation only when the discharge point is less than 250 feet from the drainage channel. When discharged onto slopes with gradients of 16 to 45 percent, the sediment has a high probability of contributing to stream sedimentation only when the discharge point is less than 350 feet from the drainage channel. When sediment is discharged onto slopes with gradients greater than 45 percent, it has a high probability of contributing to stream sedimentation only when the discharge point is less than 600 feet from the drainage channel.

Wildlife Habitat

The survey area contains diverse wildlife habitat and populations of many game and nongame wildlife species. Big-game species include elk, moose, black bear, white-tailed deer, mule deer, and mountain goat. Big-game hunting is a popular recreational activity within the survey area. The survey area contains large elk herds, and elk hunting is a particularly popular activity.

Wildlife habitat management in the survey area usually consists of two general kinds of activities. Existing wildlife habitat values are identified and protected or enhanced by coordinating activities, such as timber harvest, road construction, and recreation use, with the use of habitat by wildlife. Habitat is also directly improved by practices such as prescribed burning to improve the quality of vegetation for wildlife use.

Soil properties, slope, elevation, aspect, and other properties of the map units in this survey directly affect the potential kind and amount of vegetation available for wildlife use and its accessibility. This survey can be used to help identify and inventory potential wildlife habitat. When inventorying wildlife habitat, soil survey map units can be used as sampling units, thereby holding relatively constant those properties affecting the potential kind and amount of vegetation and its accessibility to wildlife. When planning, the properties of map units can be used to evaluate potential habitat values of alternative areas and the potential for habitat improvement. Wildlife biologists should be consulted when using this survey to rate potential habitat values of map units. The importance of map unit properties in evaluating potential habitat value varies with different species and with the location of map unit delineations.

Wildfire

Plans for wildfire control are incorporated into land management plans and fire management plans. This soil survey can be used to estimate suppression costs and predict effects of fire on vegetation and soils.

The map unit descriptions in the "Detailed Soil Map Units" section describe the habitat types and their distribution within map units. Habitat types can be used to help predict the response of vegetation to fire.

Suppression costs are partially dependent on terrain and soil properties described in detailed map unit descriptions. Steepness of the slopes, rock outcrop, and rock-fragment content of soil surface layers are some of the properties that affect the cost of fireline construction. Surface layer erodibility given in Table 4 can be used to plan erosion-control practices for soils disturbed by fire suppression activities.

Recreation

Recreational activities within the survey area include hunting, fishing, camping, cross-country skiing, downhill skiing, and hiking. Soil properties, slope, aspect, elevation, vegetation, and other properties of map units affect suitability for recreational use. This survey can be used in recreation planning to identify areas suitable for a recreational use and limitations to that use. Specialists in recreational use should be consulted to determine which map unit properties affect a given recreational use. Detailed map unit descriptions can then be used to identify suitability and limitations for that use.

Minerals

This survey can be used to help evaluate the effect of mineral exploration activities on soils and vegetation and to recommend conservation practices for rehabilitating areas disturbed by exploration. The soils, vegetation, and landforms are described in detailed map unit descriptions. Table 7, "Road Construction and Maintenance," gives limitations to excavation and revegetation of roadcuts and fill slopes. These limitations apply to many kinds of mineral exploration activities. These ratings can be used to recommend which erosion- and sediment-control practices should be applied following mineral exploration activities.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. Table 10 shows the classification of soils at the order level. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The taxonomic categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variable within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning pale, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Cryochrept (*Cry*, meaning cold, plus *ochrept*, the suborder of the Inceptisols that have an ochric epipedon).

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

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 considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is Typic Cryochrepts, sandy, mixed.

SERIES. The series consists of soils within a family that have horizons similar in arrangement in the profile, color, consistence, mineral and chemical composition, reaction, structure, and texture. The texture of the surface layer or of the substratum can differ within a series. Series were not recognized in this survey.

Several assumptions were made in classifying the soils in this survey area. Assumptions are made because criteria for classification often requires laboratory data or observations not available when classification decisions are made. This is particularly true of classes dependent upon temperature, moisture, and chemical data.

Soils in the survey area are in cryic or frigid temperature regimes. Cryic soils occur at elevations above 4,500 to 5,000 feet on northerly aspects and above 5,500 feet on southerly aspects. Other soils are in a frigid temperature regime. Some soils in a mesic temperature regime are included in mapping with frigid soils.

Soils in the survey area are in either udic or xeric moisture regimes. Ponderosa pine and Douglas-fir series habitat types, habitat types in the dry end of the grand fir series, and grasslands are used as indicators of the xeric moisture regime. Other soils are considered to be in the udic moisture regime.

Ochrepts and Boralfs in the survey area are assumed to be nonbase saturated if they are associated with grand fir or moister habitat series or

occur above elevations of 5,000 feet where average annual precipitation is more than 40 inches. Available laboratory data indicates that this is an approximate, if imperfect, assumption. Some soils under western red cedar have base-saturated surface layers, possibly caused by the ability of cedar to concentrate cations in the rooting zone.

Soils in xeric moisture regimes are assumed to be 75 percent base saturated or less based upon limited laboratory data. Soils more than 75 percent base saturated are of minor extent and are included in mapping with soils that are less base saturated.

Many soils in the survey area have a surface layer of loess that has been influenced by volcanic ash. These surface layers have from 25 to 80 percent volcanic glass shards in the silt and very fine sand particle-size fraction. The mean is near 60 percent, and the mode is near 70 percent. The 15-bar water retention of these materials is near 15 percent by weight. The surface layers are sometimes weakly thixotropic. Soils in the frigid temperature regime that have ash-influenced surface layers greater than 14-inches thick are called Vitrandepts because they hold less than 20 percent water at 15-bars of soil moisture tension. The Vitrandepts are called medial at the family taxonomic level because they have less than 60 percent glass shards and feel loamy after prolonged rubbing.

A reference pedon for each subgroup or higher taxa used to represent soils in map units follows. Family level taxa used to represent soils in map units are compared to the reference subgroup pedon. A *Range of Characteristics* is given for each taxa. Values and names of characteristics are listed in decreasing order of occurrence. Properties of taxa at higher levels than reference pedons are briefly described.

Most soils are mapped at the family level of taxonomy, but a few are mapped at higher levels. Map units in which soils were mapped at the family level are named using subgroup reference taxa for brevity. Table 3 gives the complete names of soils mapped in map units.

Alfisols

Alfisols are soils that have an accumulation of clay in the subsoil and have surface layers with low base saturation. These soils usually form in materials derived from basalt, andesite, Tertiary sediments, or fine-grained metasedimentary rocks. Less frequently, these soils form in material derived from schist, gneiss, and granitic rocks. Most Alfisols occur mainly at elevations of 1,400 to 6,800 feet on gently sloping to moderately steep landscapes. Average annual precipitation ranges from 15 to 50 inches. The order Alfisol is used in the names of two map units in this survey.

Alfisols

Representative Pedon

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

A—0 to 9 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; many medium and coarse roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

2Bt1—9 to 19 inches; weak red (2.5YR 4/2) clay loam; strong medium subangular blocky structure; very firm, very sticky, very plastic; common fine, medium, and coarse roots; many prominent clay films on faces of peds; 5 percent gravel; slightly acid; gradual smooth boundary.

2Bt2—19 to 31 inches; reddish brown (2.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, medium, and coarse roots; few faint clay films on faces of peds; 5 percent gravel; slightly acid; diffuse smooth boundary.

2BC—31 to 60 inches; reddish brown (2.5YR 4/4) gravelly sandy clay loam; moderate medium subangular blocky structure; firm, moderately sticky, moderately plastic; few fine and medium roots; 25 percent gravel; very strongly acid.

Location and Setting

North Central Idaho, Idaho County, Salmon River drainage, Slate Creek, SE 1/4, Sec. 35, T. 27 N., R. 3 E., detailed soil map unit 50CUU. The soil profile described is a Eutric Glossoboralf, fine-loamy, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from gneiss. This pedon occurs on a landslide deposit. The elevation is 4,460 feet. Slope is 20 percent, and the aspect is southerly. The habitat type is grand fir/beargrass-goldthread.

Range in Characteristics

The range of soil characteristics of Alfisols is based upon 171 detailed pedon descriptions.

Surface:

Hue ranges 5YR to 5Y; value ranges from 2 to 6; chroma ranges from 1 to 8. Texture is silt loam, loam, silty clay loam, sandy loam, clay loam, or

sandy clay loam. The content of rock fragments ranges from 0 to 80 percent. The litter is 0- to 4-inches thick. The horizon is 1- to 30-inches thick.

Subsoil:

Hue ranges from 2.5YR to 5Y; value ranges from 3 to 8; chroma ranges from 1 to 8. Texture is loam, silt loam, clay loam, silty clay loam, sandy clay loam, silty clay, or clay. The content of rock fragments ranges from 0 to 80 percent. The horizon is 6- to >49-inches thick.

Boralfs

Boralfs are Alfisols in frigid and cryic temperature regimes. Most Boralfs occur at elevations between 2,300 and 6,800 feet on gently sloping to moderately steep landscapes. Some Boralfs in the survey area have surface layers that have been influenced by volcanic ash. These surface layers are up to 20-inches thick. Average annual precipitation ranges from 25 to 50 inches.

Cryoboralfs

Cryoboralfs are cold Boralfs. These soils occur at elevations between 4,000 and 6,800 feet.

Andeptic Cryoboralfs

Andeptic Cryoboralfs are Cryoboralfs with loess surface layers that have been influenced by volcanic ash. These surface layers are more than 7-inches thick. These soils have lower soil layers formed in material derived from basalt or andesite. Andeptic Cryoboralfs share common taxonomic boundaries with Mollic Cryoboralfs, Eutric Glossoboralfs, and Entic Cryandepts in the survey area. These soils are on the warm, dry end of the Cryoboralfs. Andeptic Cryoboralfs are used to characterize a soil component in the name of one map unit in this survey.

Representative Pedon

O—2 inches to 0; partially decomposed forest litter.

Bs—0 to 9 inches; brown to dark brown (7.5YR 4/4) gravelly silt loam; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 25 percent gravel; medium acid; clear smooth boundary.

2BA—9 to 15 inches; brown to dark brown (10YR 4/3) very gravelly silt loam; moderate medium subangular blocky structure breaking to moderate medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 45 percent gravel; strongly acid; clear wavy boundary.

2Bt1—15 to 27 inches; dark yellowish brown (10YR 4/4) very gravelly silt loam; moderate medium subangular blocky structure breaking to moderate medium granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine and many medium roots, common faint clay films on faces of peds and lining tubular and interstitial pores; 50 percent gravel; medium acid; clear smooth boundary.

2Bt2—27 to 44 inches; dark yellowish brown (10YR 4/4) very gravelly silty clay loam; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine, fine, and medium roots; clay films on gravel; 40 percent gravel; strongly acid; abrupt smooth boundary.

3Bt3—44 to 60 inches; brown to dark brown (10YR 4/4) extremely gravelly clay loam; 90 percent gravel; medium acid.

Location and Setting

North Central Idaho, Idaho County, Mill Creek, Adams Work Center, NW 1/4 of SW 1/4, Sec. 25, T. 27 N., R. 3 E., detailed soil map unit 22AHR. The soil profile described is an Andeptic Cryoboralf, loamy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from basalt. This pedon occurs on low-relief rolling uplands. The elevation is 5,200 feet. Slope is 20 percent, and the aspect is westerly. The habitat type is grand fir/beargrass-goldthread.

Range in Characteristics

The range of soil characteristics of Andeptic Cryoboralfs, loamy-skeletal, mixed, is based upon 10 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 2 to 4; chroma ranges from 2 to 4. Texture is silt loam, clay loam, loam, or silty clay loam. The content of rock fragments ranges from 0 to 80 percent. The litter is 1- to 3-inches thick. The horizon is 2- to 22-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 2 to 8. Texture is silty clay loam, silt loam, silty clay, loam, or clay loam. The content of rock

fragments ranges from 20 to 80 percent. The horizon is 40- to 45-inches thick.

Substratum:

Hue is 7.5YR or 2.5Y; value is 4 or 6; chroma is 4 or 6. Texture is silty clay loam, silty clay, or clay. The content of rock fragments ranges from 75 to 80 percent.

Mollic Cryoboralfs

Mollic Cryoboralfs are Cryoboralfs with a dark-colored surface layer. These soils form in material derived from andesite and basalt. These soils occur at elevations of 4,800 to 6,700 feet. They share common taxonomic boundaries with Andeptic Cryoboralfs, Eutric Glossoboralfs, and Ultic Argixerolls. These soils have more than a normal amount of volcanic ash influence in the surface layer. Mollic Cryoboralfs are used to characterize a soil component in the name of one map unit in this survey.

Representative Pedon

Oe—2 inches to 1 inch; partially decomposed litter.

Oa—1 inch to 0; decomposed litter.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, medium, and coarse and few fine roots; 15 percent gravel; neutral; abrupt wavy boundary.

A2—4 to 11 inches; dark brown (10YR 3/3) gravelly silt loam; moderate to fine subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; common very fine, few fine, and many medium and coarse roots; 20 percent gravel; slightly acid; clear wavy boundary.

Bt1—11 to 27 inches; dark yellowish brown (10YR 4/4) very gravelly silt loam; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine and many medium and coarse roots; few faint clay films on faces of peds; 50 percent gravel; medium acid; clear wavy boundary.

Bt2—27 to 36 inches; yellowish brown (10YR 5/4) extremely gravelly silt loam; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine and common medium and coarse roots; few faint clay films on faces of peds; 70 percent gravel; medium acid; abrupt wavy boundary.

Cr—36 to 37 inches; fractured andesite.

Location and Setting

North Central Idaho, Idaho County, Salmon River drainage, Wickiup Butte, SW 1/4, Sec. 1, T. 25 N., R. 1 W., detailed soil map unit 32AHP. The soil profile described is a Mollic Cryoboralf, loamy-skeletal, mixed. The soils formed in material derived from andesite. This pedon on the upper part of a gently sloping mountain slope. The elevation is 5,080 feet. Slope is 30 percent, and the aspect is northerly. The habitat type is grand fir/ninebark.

Range in Characteristics

The range of soil characteristics of Mollic Cryoboralfs, loamy-skeletal, mixed, is based upon eight detailed pedon descriptions.

Surface:

Hue is 10YR; value is 3; chroma is 2 or 3. Texture is silt loam or silty clay loam. The content of rock fragments ranges from 0 to 60 percent. The litter is 0- to 2-inches thick. The horizon is 6- to 25-inches thick.

Subsoil:

Hue is 10YR; value ranges from 3 to 5; chroma ranges from 2 to 4. Texture is silt loam or silty clay loam. The content of rock fragments ranges from 40 to 80 percent. The horizon is 19- to 25-inches thick.

Glossoboralfs

Glossoboralfs are cool Boralfs that are low in bases.

Eutric Glossoboralfs

Eutric Glossoboralfs are Glossoboralfs with no tonguing of albic materials into the argillic horizon. These soils developed in material derived from Tertiary sediments, basalt, andesite, and well-weathered metasediments. Eutric Glossoboralfs formed in materials derived from well-weathered metasediments, particularly in the Selway River drainage, have weakly developed argillic horizons. Eutric Glossoboralfs occur mainly at elevations of 2,300 to 5,500 feet. Eutric Glossoboralfs typically have loess surface layers that have been influenced by volcanic ash. Eutric Glossoboralfs share common taxonomic boundaries with Ultic Argixerolls, Andic Dystrochrepts, Entic Cryandepts, Andic Cryochrepts, Mollic Cryoboralfs, and Andeptic Cryoboralfs. These soils are on the cold end of the range for Glossoboralfs. Eutric Glossoboralfs are used to

characterize a soil component in the name of six map units in this survey.

Representative Pedon

A1—0 to 9 inches; brown to dark brown (7.5YR 4/3) silt loam; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; many very fine, fine, medium, and coarse roots; 10 percent rounded quartz gravel; slightly acid; abrupt wavy boundary.

2A2—9 to 15 inches; dark yellowish brown (10YR 3/4) extremely cobbly sandy loam; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine and medium roots; 30 percent rounded quartz gravel and 40 percent rounded quartz cobbles; medium acid; clear wavy boundary.

2E—15 to 31 inches; brown to dark brown (10YR 4/3) very gravelly sandy loam; moderate medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine roots; 35 percent rounded quartz gravel and 10 percent rounded quartz cobbles; slightly acid; abrupt wavy boundary.

2Bt1—31 to 53 inches; yellowish brown (10YR 5/6) very gravelly sandy clay loam; strong medium angular blocky structure; very hard, very firm, moderately sticky, very plastic; many faint clay films on faces of peds and pores; 30 percent rounded quartz gravel and 10 percent rounded quartz cobbles; strongly acid; clear wavy boundary.

2Bt2—53 to 60 inches; yellowish brown (10YR 5/6) very gravelly sandy clay loam; strong coarse angular blocky structure; very hard, very firm, moderately sticky, very plastic; many faint clay films on faces of peds and pores; 40 percent rounded quartz gravel and 10 percent rounded quartz cobbles; medium acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Mill Creek drainage, NW 1/4 of NW 1/4, Sec. 8, T. 29 N., R. 7 E., detailed soil map unit 46AHC. The soil profile described is an Eutric Glossoboralf, loamy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying Tertiary sediments derived from quartzite and schist. This pedon occurs on a gently sloping glacial moraine. The elevation is 5,340 feet. Slope is 20 percent, and the aspect is southwesterly. The habitat type is grand fir/queencup beadlily-beargrass.

Range in Characteristics

The range of soil family characteristics of Eutric Glossoboralfs, loamy-skeletal, mixed, is based upon 20 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 2 to 4; chroma ranges from 2 to 6. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 50 percent. The litter is 0- to 3-inches thick. The horizon is 7- to 23-inches thick.

Subsoil:

Hue is 5YR; value ranges from 3 to 6; chroma ranges from 3 to 6. Texture is silty clay loam, clay loam, silt loam, loam, sandy clay loam, sandy loam, or silty clay. The content of rock fragments ranges from 35 to 80 percent.

Eutric Glossoboralfs, fine-loamy, mixed

These soils are like the reference pedon, except the subsoils contain less than 35 percent rock fragments.

Range in Characteristics

The range of soil family characteristics of Eutric Glossoboralfs, fine-loamy, mixed, is based upon 11 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 2 to 4; chroma ranges from 2 to 4. Texture is loam, silt loam, or sandy loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 1- to 2-inches thick. The horizon is 3- to 14-inches thick.

Subsoil:

Hue ranges from 2.5YR to 10YR; value ranges from 3 to 8; chroma ranges from 2 to 8. Texture is silt loam, clay loam, loam, silty clay loam, sandy clay loam, sandy loam, silty clay, clay, or sandy clay. The content of rock fragments ranges from 0 to 40 percent.

Entisols

Entisols are soils that show little development. In this survey area, they occur on flood plains that receive new deposits of alluvium at frequent intervals or on revegetated mine spoils. Entisols generally occur at elevations of 1,300 to 5,800 feet. Entisols are used to characterize the name of a soil component in

one map unit. This map unit is variable at lower levels of classification. Great groups include Cryofluvents, Xerorthents, Udipsamments, and Xeropsamments.

Representative Pedon

A—0 to 8 inches; dark brown (7.5YR 4/4) gravelly sandy loam; single grain to weak granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 15 percent rounded gravel; strongly acid; gradual smooth boundary.

2C—8 to 31 inches; yellowish brown (10YR 5/6) very gravelly sand; single grain; loose, nonsticky, nonplastic; 30 percent rounded gravel, 10 percent rounded cobbles; medium acid; clear wavy boundary.

3C—31 to 38 inches; yellowish brown (10YR 5/6) sand; single grain; loose, nonsticky, nonplastic; 5 percent rounded gravel, 5 percent rounded cobbles, discontinuous bands 3-inches thick of gravel and cobble; medium acid; clear smooth boundary.

4C—38 to 50 inches; yellowish brown (10YR 5/4) extremely cobbly sand; single grain; loose, nonsticky, nonplastic; 40 percent rounded gravel, 30 percent rounded cobbles; strongly acid; very dark gray bands high in organic matter at the base of this horizon; abrupt smooth boundary.

5C—50 to 97 inches; reddish yellow (7.5YR 6/6) very gravelly sand; single grain, loose, nonsticky, nonplastic; 35 percent rounded gravel, 3 percent rounded cobbles; very strongly acid.

Location and Setting

North Central Idaho, Idaho County, American River, Buffalo Gulch, NW 1/4 of SW 1/4, Sec. 28, T. 29 N., R. 8 E., detailed soil map unit 10AUU. The soil profile described is a Typic Cryofluvent, sandy-skeletal, mixed. This soil has formed in alluvium on a stream flood plain at an elevation of 4,000 feet. The habitat type is estimated to be subalpine fir/blue huckleberry. These soils are not extensive in the survey area.

Range in Characteristics

The range of soil characteristics of Entisols is based upon nine detailed pedon descriptions.

Surface:

Hue ranges from 7.5YR to 2.5Y; value ranges from 2 to 4; chroma ranges from 1 to 3. Texture is loamy sand, sandy loam, silt loam, or sand. The content of rock fragments ranges from 0 to 65 percent. The litter is 0- to 2-inches thick. The horizon is 2- to 8-inches thick.

Substratum:

Hue ranges from 7.5YR to 5Y; value ranges from 3 to 6; chroma ranges from 1 to 6. Texture is sand, loamy sand, sandy loam, or silt loam. The content of rock fragments ranges from 0 to 80 percent.

Inceptisols

Inceptisols are soils that have altered horizons through the loss of bases or of iron and aluminum but which retain some weatherable minerals. These soils most commonly have an ochric epipedon and a cambic horizon. Inceptisols occur mainly at elevations of 1,400 to 8,400 feet on gently sloping to very steep landscapes. Average annual precipitation ranges from 18 to more than 60 inches. Inceptisols are used to characterize a soil component in the names of three map units in this survey. These map units are variable at lower levels of soil classification. Great groups include Cryumbrepts, Haplumbrepts, Xerumbrepts, Xerochrepts, Dystrochrepts, Cryochrepts, Vitrandepts, Cryandepts, Cryaquepts, Haplaquepts, and Fragiaquepts.

Representative Pedon

Oi—1 inch to 0; coniferous and deciduous leaf litter and twigs.

A—0 to 9 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure, soft, friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent gravel; medium acid; abrupt wavy boundary.

Bs—9 to 21 inches; dark brown (7.5YR 3/4) silt loam; moderate medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; 5 percent gravel; medium acid; abrupt wavy boundary.

2Bw—21 to 46 inches; brown to dark brown (10YR 4/3) very cobbly loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; 20 percent gravel, 20 percent cobbles, and 10 percent stones; strongly acid; abrupt wavy boundary.

2C—46 to 60 inches; brown (10YR 5/3) fine sandy loam; massive; nonsticky, nonplastic; few fine roots, strongly acid.

Location and Setting

North Central Idaho, Idaho County, Selway River, Hamby Creek, NE 1/4, Sec. 19, T. 31 N., R. 7 E., detailed soil map unit 50CUU. The soil profile described is an Umbric Vitrandept, medial over loamy, mixed, frigid. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from schist. This pedon occurs on the lower slope of a landslide deposit. The elevation is 4,440 feet. Slope is 45 percent, and the aspect is northerly. The habitat type is grand fir/ arrowleaf groundsel.

Range in Characteristics

The range of soil characteristics of Inceptisols is based upon 641 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 1 to 5; chroma ranges from 1 to 6. Texture is silt loam, loam, sandy loam, loamy sand, or silty clay. The content of rock fragments ranges from 0 to 80 percent. The litter is 0- to 5-inches thick. The horizon is 1- to 59-inches thick.

Subsoil:

Hue ranges from 7.5YR to 5Y; value ranges from 2 to 7; chroma ranges from 1 to 8. Texture is sandy loam, loam, silty loam, loamy sand, silty clay loam, sandy clay loam, or silty clay. The content of rock fragments ranges from 0 to 80 percent. The horizon is 0- to 41-inches thick.

Substratum:

Hue ranges from 5YR to 5Y; value ranges from 2 to 7; chroma ranges from 1 to 8. Texture is loamy sand, sandy loam, fine sandy loam, sand, loam, silt loam, silty clay loam, clay loam, or sandy clay loam. The content of rock fragments ranges from 0 to 80 percent.

Andepts

Andepts in the survey area are soils with loess surface layers that have been influenced by volcanic ash. These surface layers are 14- to 20-inches thick and have a bulk density ranging from .65 to .85 gram per cubic centimeter. Laboratory data indicate the loess contains 60 to 70 percent glass shards in the fine sand and silt particle-size fractions. Most of the shards seem to be from the eruption of Mount Mazama 6,700 years ago in southwestern Oregon. The loess is silt loam, loam, or fine sandy loam in texture and is 35 to 50 percent silt. X-ray defraction indicates large amounts of amorphous material in the clay particle-size fraction.

The loess surface layers can overlie any of the parent materials found in the survey area. Andepts are most common on broad ridges, in swales, and on northerly aspects in the Selway River drainage. Andepts are on gently sloping to extremely steep mountain slopes under coniferous forests. Andepts generally occur at elevations from 1,400 to 8,400 feet with 30 to 60 inches or more average annual precipitation. Surface layers that have been influenced by volcanic ash are the most fertile part of most Andepts because lower soil layers are often coarser in texture.

Cryandepts

Cryandepts are cold Andepts. Cryandepts generally occur at elevations above 4,000 feet on northerly aspects and above 5,500 feet on southerly aspects. Cryandepts are used to characterize a soil component in the name of one map unit in this survey. This map unit is complex and variable at lower levels of classification. Subgroups include Entic and Typic.

Representative Pedon

Oi—1 inch to 0; undecomposed coniferous litter.

A1—0 to 3 inches; very dark brown (10YR 2/2) loam; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine common coarse roots; very strongly acid; clear wavy boundary.

A2—3 to 16 inches; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; soft, friable, moderately sticky, nonplastic; common very fine and fine and many medium and coarse roots; medium acid; abrupt wavy boundary.

Bs—16 to 20 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; hard, friable, slightly sticky, nonplastic; common very fine, fine, and medium roots; slightly acid; abrupt wavy boundary.

2Bw—20 to 37 inches; brown to dark brown (10YR 4/3) loamy sand; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 5 percent gravel; slightly acid; clear wavy boundary.

2C—37 to 60 inches; brown to dark brown (10YR 4/3) gravelly sand; single grain; soft, very friable,

nonsticky, nonplastic; very few fine roots; 20 percent gravel; slightly acid.

Location and Setting

North Central Idaho, Idaho County, Salmon River, Nut Basin, SW 1/4, Sec. 25, T. 26 N., R. 2 E., detailed soil map unit 47A66. The soil profile described is a Typic Cryandept, medial over sandy or sandy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying glacial till derived from gneiss. This pedon is located on the upper slope of a glacial trough bottom. The elevation is 7,170 feet. Slope is 20 percent, and the aspect is southeasterly. The habitat type is subalpine fir/beargrass-grouse whortleberry.

Range in Characteristics

The range of soil characteristics of Cryandepts is based upon 69 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 1 to 4; chroma ranges from 1 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 25 percent. The litter is 0- to 4-inches thick. The horizon is 2- to 21-inches thick.

Upper Subsoil:

Hue ranges from 5YR to 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is loam, silt loam, or sandy loam. The content of rock fragments ranges from 0 to 80 percent. The horizon is 0- to 28-inches thick.

Lower Subsoil:

Hue ranges from 7.5YR to 2.5Y; value ranges from 3 to 6; chroma ranges from 3 to 6. Texture is sandy loam, loamy sand, loam, sand, or silt loam. The content of rock fragments ranges from 0 to 80 percent.

Entic Cryandepts

Entic Cryandepts are Cryandepts with light-colored or thin dark-colored surface layers. On slopes steeper than 40 percent, they occur most frequently in depressions or on lower slope positions. Entic Cryandepts share common taxonomic boundaries with Andic Cryochrepts, Typic Vitrandepts, and Andic Dystrochrepts in the survey area. These soils are on the warm end of the taxonomic class and have layers of material that have been influenced by volcanic ash and are thinner than average. These soils are productive timber sites with few limitations to forest regeneration. Entic Cryandepts are used to characterize a soil component in the names of 11 map units in this survey.

Representative Pedon

Oi—3 to 2 inches; undecomposed needles, twigs, and leaves.

Oe—2 inches to 0; partially decomposed litter.

A—0 to 4 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent gravel; slightly acid; clear wavy boundary.

Bs—4 to 17 inches; brown (7.5YR 4/4) silt loam, moderate medium granular structure; soft, very friable, slightly sticky, nonplastic; common medium and coarse roots; 5 percent gravel; medium acid; abrupt wavy boundary.

2Bw1—17 to 25 inches; brown to dark brown (10YR 4/3) cobbly loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; few fine and common medium and coarse roots; 10 percent gravel, 20 percent cobbles; slightly acid; clear wavy boundary.

2Bw2—25 to 60 inches; brown to dark brown (10YR 4/3) very cobbly sandy loam; moderate medium subangular blocky structure; hard, friable, nonsticky, nonplastic; common medium and coarse roots; 30 percent gravel, 20 percent cobbles; slightly acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Elk Summit, NW 1/4, Sec. 36, T. 30 N., R. 7 E., detailed soil map unit 31C8B. The soil profile described is an Entic Cryandept, medial over loamy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from gneiss. This pedon occurs on the upper part of a moderately steep mountain slope. The elevation is 5,680 feet. Slope is 35 percent, and the aspect is southeasterly. The habitat type is grand fir/queencup beadlily-menziesia.

Range in Characteristics

The range of soil characteristics of Entic Cryandepts, medial over loamy-skeletal, mixed, is based upon 23 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 2 to 4; chroma ranges from 2 to 4. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 25 percent. The

litter is 1- to 4-inches thick. The horizon is 2- to 17-inches thick.

Upper Subsoil:
Hue ranges from 5YR to 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is loam, silt loam, or sandy loam. The content of rock fragments ranges from 0 to 80 percent. The horizon is 3- to 31-inches thick.

Lower Subsoil:
Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma is 3 or 4. Texture is sandy loam, loam, or loamy sand. The content of rock fragments ranges from 35 to 80 percent.

Entic Cryandepts, medial over loamy, mixed

These soils are like the reference pedon, except the subsoils contain less than 35 percent rock fragments. The soils are underlain by well-weathered bedrock.

Range in Characteristics

The range of soil characteristics of Entic Cryandepts, medial over loamy, mixed, is based upon 11 detailed pedon descriptions.

Surface:
Hue is 7.5YR or 10YR; value ranges from 2 to 4; chroma ranges from 2 to 4. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 10 percent. The litter is 0- to 2-inches thick. The horizon is 2- to 17-inches thick.

Upper Subsoil:
Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is sandy loam, loam, or silt loam. The content of rock fragments ranges from 0 to 30 percent. The horizon is 14- to 35-inches thick.

Lower Subsoil:
Hue is 10YR; value ranges from 4 to 6; chroma ranges from 3 to 6. Texture is sandy loam, loamy sand, sand, or loam. The content of rock fragments ranges from 0 to 60 percent.

Entic Cryandepts, medial over sandy or sandy-skeletal, mixed

These soils are like the reference pedon, except the subsoils are thin and have a coarse-textured lower soil layer. These soils are associated with material derived from gneiss, quartzite, and granitic rocks.

Range in Characteristics

The range of soil characteristics of Entic Cryandepts, medial over sandy or sandy-skeletal, mixed, is based upon 13 detailed pedon descriptions.

Surface:
Hue is 7.5YR or 10YR; value ranges from 2 to 5; chroma ranges from 2 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 25 percent. The litter is 0- to 4-inches thick. The horizon is 2- to 17-inches thick.

Subsoil:
Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma is 4 or 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 60 percent. The horizon is 6- to 24-inches thick.

Substratum:
Hue is 10YR or 2.5Y; value ranges from 4 to 6; chroma ranges from 3 to 6. Texture is loamy sand or sand. The content of rock fragments ranges from 20 to 80 percent.

Typic Cryandepts

Typic Cryandepts are Cryandepts with thick dark-colored surface layers. These soils are most common in higher elevation depressions or moist draws. These soils have fluctuating water tables that rise to or above the surface in the spring. Ground water is well aerated, and the subsoils are not gleyed or mottled. These soils are also on well-drained broad mountain ridges.

The vegetation in moist draws and depressions is mainly mountain alder or mountain meadow communities, dominated by brackenfern or western coneflower, and adjacent forests. The vegetation on broad mountain ridges is open-grown or scattered stands of subalpine fir, whitebark pine, and lodgepole pine with grass and forb understories.

Typic Cryandepts share common taxonomic boundaries with Entic Cryandepts and Entic Cryumbrepts in the survey area. They occupy the wet end of the class in moist draws and depressions and the dry end of the class on broadly convex ridges. Typic Cryandepts are used to characterize a soil component in the names of 10 map units in this survey.

Representative Pedon

A1—0 to 8 inches; very dark brown (10YR 2/2) silt loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; common very fine, fine, and medium roots; strongly acid; clear wavy boundary.

A2—8 to 19 inches; dark brown (10YR 3/3) silt loam; moderate medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few very fine, fine, and medium roots; strongly acid; abrupt irregular boundary.

2Bw1—19 to 41 inches; brown to dark brown (10YR 4/3) cobbly sandy loam; moderate medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few fine roots; 10 percent gravel and 10 percent cobbles; strongly acid; abrupt irregular boundary.

2Bw2—41 to 50 inches; brown to dark brown (7.5YR 4/4) gravelly loamy sand; weak coarse subangular blocky structure; soft, friable, nonsticky, nonplastic; 20 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

2CB—50 to 60 inches; brown (10YR 5/3) cobbly loamy sand; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; 10 percent gravel and 10 percent cobbles; very strongly acid.

Location and Setting

North Central Idaho, Idaho County, Selway River, SOB Point; NE 1/4, Sec. 14, T. 31 N., R. 8 E., detailed soil map unit 24C8B. The soil profile described is a Typic Cryandept, medial over loamy, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from well-weathered schist. This pedon is located midslope on a high-relief rolling upland. The elevation is 5,300 feet. Slope is 40 percent, and the aspect is northerly. The vegetation consists of a moist forest opening.

Range in Characteristics

The range of soil characteristics of Typic Cryandepts, medial over loamy, mixed, is based upon 11 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 2 or 3; chroma is 2 or 3. Texture is loam or silt loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 0- to 4-inches thick. The horizon is 10- to 24-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value is 3 or 4; chroma is 3 or 4. Texture is loam, sandy loam, silt, or loamy sand. The content of rock fragments ranges from 0 to 20 percent. The horizon is 6- to 22-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value is 4 or 5; chroma is 3 or 4. Texture is sandy loam, loamy sand, or loam. The content of rock fragments ranges from 5 to 45 percent.

Typic Cryandepts, medial over loamy-skeletal, mixed

These soils are like the reference pedon, except the subsoils contain 35 percent or more rock fragments. These soils are associated with bedrock that is no more than moderately weathered.

Range in Characteristics

The range of soil characteristics of Typic Cryandepts, medial over loamy-skeletal, mixed, is based upon eight detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 2 or 3; chroma ranges from 1 to 3. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 20 percent. The litter is 0- to 6-inches thick. The horizon is 10- to 26-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma is 3 or 4. Texture is loam or silt loam. The content of rock fragments ranges from 5 to 80 percent. The horizon is 9- to 34-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is sandy loam, loam, loamy sand, or sand. The content of rock fragments ranges from 55 to 75 percent.

Typic Cryandepts, medial over sandy or sandy-skeletal, mixed

These soils are like the reference pedon, except they have thinner subsoils and always have sandy lower soil layers.

Range in Characteristics

The range of soil characteristics of Typic Cryandepts, medial over sandy or sandy-skeletal,

mixed, is based upon three detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 2 or 3; chroma is 2. Texture is sandy loam or silt loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 0- to 2-inches thick. The horizon is 10- to 13-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value is 3 or 4; chroma is 4. Texture is sandy loam or loam. The content of rock fragments ranges from 0 to 35 percent. The horizon is 5- to 23-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value is 4 or 5; chroma is 3 or 6. Texture is loamy sand or sand. The content of rock fragments ranges from 50 to 80 percent.

Vitrandepts

Vitrandepts are Andepts with soil materials dominated by volcanic glass. The criterion used to identify glass-dominated volcanic ash is a wilting point (15-bar) water retention of less than 20 percent. Most material in the survey area that has been influenced by volcanic ash meets this requirement, so all Andepts not in the cryic temperature regime are considered Vitrandepts. Vitrandepts generally occur at elevations of 1,300 to 5,500 feet in the 30- to 60-inch mean annual precipitation zone. These soils are most common on slopes of less than 50 percent, on lower slope positions, and on northerly aspects. Vitrandepts share common taxonomic boundaries with Cryandepts, Cryochrepts, and Dystrochrepts in the survey area. These soils are on the cold end of the class, with material that is rich in volcanic ash, and layers that are more shallow than is normal.

Typic Vitrandepts

Typic Vitrandepts are freely drained Vitrandepts with light-colored surface layers. These soils are within the central concept, or typical member, of the Vitrandepts great group. These soils generally are underlain by material derived from well-weathered gneiss, schist, quartzite, and granitic rocks. Habitat types are in the grand fir and western red cedar series, usually in the moist end of the range. Typic Vitrandepts share common taxonomic boundaries with Entic Cryandepts and Andic Dystrochrepts in the survey area. They occupy the cold end of the class, have layers of material that has been influenced by volcanic ash, and have surface layers that are thinner than average. These soils are productive timber sites with few limitations to forest regeneration. Typic Vitrandepts are used to characterize a soil component in the names of five map units in this survey.

Representative Pedon

O—2 inches to 0; partially decomposed needles and twigs.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and coarse and common medium roots; 16 percent gravel; medium acid; clear smooth boundary.

Bs—5 to 15 inches; brown to dark brown (7.5YR 4/4) gravelly silt loam; weak medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and coarse and common fine and medium roots; 15 percent gravel; slightly acid; clear smooth boundary.

2Bw—15 to 37 inches; brown to dark brown (7.5YR 4/4) gravelly coarse sandy loam; moderate medium subangular blocky structure parting to weak medium granular; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; 18 percent gravel; medium acid; clear smooth boundary.

2Cl—37 to 51 inches; light brownish gray (10YR 6/2) sandy loam; massive; soft, very friable, slightly sticky, nonplastic; common very fine roots; 6 percent gravel; strongly acid; shows color and banding of gneiss parent material; smooth irregular boundary.

2C2—51 to 64 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand; massive; slightly hard, friable, nonsticky, nonplastic; common very fine roots; 17 percent gravel; strongly acid.

Location and Setting

North Central Idaho, Idaho County, Selway River drainage, Horse Creek, SE 1/4 of NE 1/4, Sec. 30, T. 31 N., R. 9 E., detailed soil map unit 24C41. The soil profile described is a Typic Vitrandept, medial over loamy, mixed, frigid. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from slightly micaceous Precambrian gneiss of the Wallace Formation. This pedon occurs on the upper side slope of a high-relief rolling upland. The elevation is 5,110 feet. Slope is 40 percent, and the aspect is easterly. The habitat type is western red cedar/wild ginger.

Range in Characteristics

The range of soil characteristics of Typic Vitrandepts, medial over loamy, mixed, frigid, is based upon 23 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 2 to 4; chroma ranges from 2 to 5. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 16 percent. The litter is 0- to 3-inches thick. The horizon is 4- to 9-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma is 3 or 4. Texture is loam, silt loam, sandy loam, or coarse sandy loam. The content of rock fragments ranges from 0 to 25 percent. The horizon is 10- to 33-inches thick.

Substratum:

Hue is 10YR; value ranges from 3 to 6; chroma ranges from 2 to 4. Texture is sandy loam, loamy sand, loam, or sand. The content of rock fragments ranges from 0 to 55 percent.

Aquepts

Aquepts in the survey area are on flood plains and in depressions with water tables near the surface. The vegetation consists of wet forest and shrubs, ferns, forbs, and sedges. Aquepts are used to characterize a soil component in the names of two map units in this survey. These map units are variable at lower levels of classification. Great groups include Haplaquepts, Fragiaquepts, Humaquepts, Ochraquepts, and Cryaquepts.

Representative Pedon

Ag—0 to 4 inches; dark gray (5Y 4/1) silt loam; moderate medium granular structure; moderately sticky, moderately plastic; many fine and medium roots; very strongly acid; clear smooth boundary.

Bg1—4 to 11 inches; dark gray (5Y 4/1) clay loam; many fine prominent yellowish red (5YR 5/8) mottles; weak coarse angular blocky structure; very sticky, very plastic; many fine and common medium roots; strongly acid; clear smooth boundary.

Bg2—11 to 13 inches; gray (5Y 5/1) gravelly sandy clay loam; common fine distinct yellowish red (5YR 5/8) mottles; massive; very sticky, very plastic; common fine and few medium roots; 20 percent gravel; strongly acid; abrupt smooth boundary.

Bgx—13 to 25 inches; dark gray (5Y 4/1) gravelly sandy clay loam; common fine distinct yellowish red (5YR 5/8) mottles; brittle; massive; moderately sticky, moderately plastic; very few fine roots; 15 percent gravel; strongly acid; clear wavy boundary.

2C—25 to 60 inches; dark gray (5Y 4/1) gravelly loamy sand; massive; nonsticky, nonplastic; 15 percent gravel; strongly acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Rainbold Ridge, NE 1/4, Sec. 11, T. 28 N., R. 5 E., detailed soil map unit 22A33. The soil profile described is a Typic Fragiaquept, fine-loamy, mixed, frigid. The parent material is loess that has been influenced by volcanic ash and that is mixed with material derived from granitic rocks. This pedon is located in a depression on low-relief rolling uplands. The elevation is 4,850 feet. Slope is 10 percent, and the aspect is southeasterly. The community type is alder and sedges.

Range in Characteristics

The range of soil characteristics of Aquepts is based upon 20 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 5Y; value ranges from 2 to 5; chroma ranges from 1 to 3. Texture is silt loam, loam, sandy loam, or silty clay loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 0- to 14-inches thick. The horizon is 0- to 18-inches thick.

Subsoil:

Hue ranges from 10YR to 5Y; value ranges from 3 to 6; chroma ranges from 1 to 4. Texture is silt loam, sandy loam, loam, sandy clay loam, silty clay loam, or clay loam. The content of rock fragments ranges from 0 to 75 percent. The horizon is 0- to 21-inches thick.

Substratum:

Hue ranges from 2.5YR to 5Y; value ranges from 2 to 6; chroma ranges from 1 to 6. Texture is sandy loam, silt loam, sand, clay loam, sandy clay loam, or loamy sand. The content of rock fragments ranges from 0 to 55 percent.

Cryaquepts

Cryaquepts are cold Aquepts of high-elevation flood plains and depressions. The vegetation consists of sedge meadows, shrub-forb communities, wet forest on grand fir, or subalpine fir habitat types. These soils are with Cryochrepts and Cryumbrepts in these map units. Cryaquepts are most limited by high water tables and cold soil temperatures. These soils have low strength because of soil wetness. Cryaquepts are used to characterize a soil component in the names of 12 map units in this survey. These map units are variable at lower orders of classifications. Subgroups include Humic, Aquic, Andic, Histic, Entic, Typic, and Aeric.

Representative Pedon

Oi—1 inch to 0; undecomposed forest litter.
A—0 to 4 inches; dark brown (7.5YR 3/2) silt loam; moderate coarse subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; few fine and medium roots; very strongly acid; clear smooth boundary.
Bg—4 to 14 inches; dark gray (2.5Y 4/1) silt loam; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, nonplastic; few fine and common coarse roots; extremely acid; clear smooth boundary.
2C1—14 to 34 inches; grayish brown (10YR 5/2) loamy sand; common fine prominent strong brown (7.5YR 5/6) mottles; massive; slightly hard, friable, moderately sticky, nonplastic; 10 percent gravel; strongly acid; abrupt smooth boundary.
2C2—34 to 60 inches; light brownish gray (2.5Y 6/2) loamy sand; common fine prominent strong brown (7.5YR 5/6) mottles; massive; loose, moderately sticky, nonplastic; medium acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Twentymile Creek, NW 1/4 of SW 1/4, Sec. 17, T. 28 N., R. 6 E., detailed soil map unit 10AD9. The soil profile described is an Andic Cryaquept, medial over sandy or sandy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying alluvium. The profile described occurs on a nearly level stream bottom. The elevation is 4,340 feet. The habitat type is subalpine fir/twisted stalk.

Range in Characteristics

The range of soil characteristics of Cryaquepts is based upon 19 detailed pedon descriptions.

Surface:
Hue ranges from 5YR to 10YR; value ranges from 2 to 5; chroma ranges from 1 to 3. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 0- to 13-inches thick. The horizon is 2- to 14-inches thick.

Subsoil:
Hue ranges from 10YR to 5Y; value ranges from 3 to 5; chroma ranges from 1 to 4. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 75 percent. The horizon is 0- to 13-inches thick.

Substratum:
Hue ranges from 2.5YR to 5Y; value ranges from 2.5 to 6; chroma ranges from 1 to 6. Texture is sandy loam, sand, silt loam, loam, loamy sand, or silty clay. The content of rock fragments ranges from 0 to 55 percent.

Ochrepts

Ochrepts are soils with light-colored or thin dark-colored surface layers. These surface layers do not have subsoil clay accumulations or are not thick enough to qualify for the Andept suborder. Ochrepts are usually considered relatively young soils that will, given time and proper conditions, develop into soils representative of some other soil order.

Cryochrepts

Cryochrepts are cold Ochrepts. These soils occur mainly at elevations of 4,000 to 5,000 feet on northerly aspects and 5,000 to 6,000 feet on southerly aspects. Most Cryochrepts are in the 40- to 60-inch average annual precipitation zone. Cryochrepts are used to characterize a soil component in the name of one map unit in this survey. This map unit is complex and variable at lower orders of classification. Subgroups include Andic, Dystric, and Lithic Cryochrepts.

Representative Pedon

A—0 to 2 inches; dark brown (7.5YR 3/2) gravelly loam; weak fine granular structure; soft, very friable, nonsticky, nonplastic, common fine, medium, and coarse roots; 20 percent gravel; slightly acid; abrupt wavy boundary.
Bs—2 to 9 inches; brown to dark brown (7.5YR 4/4) gravelly silt loam; weak fine granular structure;

soft, very friable, nonsticky, nonplastic, common medium and coarse roots; 20 percent gravel; slightly acid; abrupt wavy boundary.

2Bw—9 to 14 inches; brown to dark brown (10YR 4/3) very gravelly loam; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common fine and medium roots; 30 percent gravel and 10 percent cobbles; strongly acid; clear wavy boundary.

2C1—14 to 24 inches; yellowish brown (10YR 5/4) very cobbly loamy sand; single grain; loose, loose, nonsticky, nonplastic; few medium and coarse roots; 30 percent gravel, 20 percent cobbles, 5 percent stones; medium acid; clear wavy boundary.

2C2—23 to 38 inches; light yellowish brown (10YR 6/4) extremely stony sand; single grain; soft, very friable, nonsticky, nonplastic; 20 percent gravel, 20 percent cobbles, 20 percent stones, 10 percent boulders; medium acid.

R—38 inches; granite bedrock.

Location and Setting

North Central Idaho, Idaho County, Elk Mountain, NE 1/4, Sec. 34, T. 30 N., R. 11 E., detailed soil map unit 41E67. The soil profile described is an Andic Cryochrept, sandy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from granitic rocks. This pedon occurs midslope on a cirque headwall. The elevation is 6,290 feet. Slope is 65 percent and the aspect is westerly. The habitat type is subalpine fir/beargrass-woodrush.

Range in Characteristics

The range of soil characteristics of Cryochrepts is based upon 135 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 5Y; value ranges from 2 to 5; chroma ranges from 1 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 80 percent. The litter is 0- to 5-inches thick. The horizon is 2- to 20-inches thick.

Subsoil:

Hue ranges from 2.5YR to 10YR; value ranges from 2 to 7; chroma ranges from 2 to 8. Texture is sandy loam, silt loam, loam, silty clay loam, or loamy fine sand. The content of rock fragments ranges from 0 to 80 percent. The horizon is 4- to 29-inches thick.

Substratum:

Hue is 2.5YR or 10YR; value ranges from 4 to 8; chroma ranges from 1 to 6. Texture is loamy sand, sand, sandy loam, loam, silt loam, or silty clay loam. The content of rock fragments ranges from 0 to 80 percent.

Andic Cryochrepts

Andic Cryochrepts are Cryochrepts with loess surface layers that have been influenced by volcanic ash. These surface layers are between 7- and 14-inches thick and have soil bulk densities of the loess layer that are less than 1 gram per cubic centimeter. Lower soil layers formed in material derived from gneiss, schist, quartzite, granitic rocks, or glacial till derived from these rocks. Andic Cryochrepts are used to characterize a soil component in the names of 29 map units in this survey. Families include loamy-skeletal, sandy, and sandy-skeletal, coarse-loamy.

Representative Pedon

A—0 to 5 inches; brown to dark brown (7.5YR 4/4) silt loam; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many fine, medium, and coarse roots, slightly acid; abrupt wavy boundary.

Bs—5 to 13 inches; yellowish brown (10YR 5/6) gravelly silt loam; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; 15 percent gravel; slightly acid; abrupt wavy boundary.

2Bw—13 to 18 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine, medium and coarse roots; 25 percent gravel and cobbles; strongly acid; abrupt wavy boundary.

2C1—18 to 30 inches; brownish yellow (10YR 6/6) very gravelly coarse sandy loam; massive; slightly hard, firm, nonsticky, nonplastic; few fine and medium roots; 40 percent gravel and cobbles; strongly acid; abrupt wavy boundary.

2C2—30 to 37 inches; brownish yellow (10YR 6/6) very gravelly coarse sandy loam; massive; slightly hard, firm, nonsticky, nonplastic; few very fine roots; 40 percent gravel and cobbles; strongly acid; clear wavy boundary.

2C3—37 to 50 inches; yellow (10YR 7/6) very gravelly coarse sandy loam; massive; slightly

hard, firm, slightly sticky, slightly plastic; few very fine roots; 50 percent gravel and cobbles; strongly acid; clear wavy boundary.

2C4—50 to 60 inches; yellow (10YR 7/6) very gravelly coarse sandy loam; massive; slightly hard, firm, nonsticky, nonplastic; few very fine roots; 50 percent gravel and cobbles; strongly acid.

Location and Setting

North Central Idaho, Idaho County, Salmon River drainage, Badger Summit, SW 1/4 of SW 1/4, Sec. 19, T. 26 N., R. 8 E., detailed soil map unit 33A65. The soil profile described is an Andic Cryochrept, loamy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from moderately weathered quartz monzonite. This pedon occurs on a gently sloping mountain ridge. The elevation is 6,900 feet. The habitat type is subalpine fir/beargrass.

Range in Characteristics

Range of subgroup characteristics for Andic Cryochrepts is based upon 75 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 2 to 5; chroma ranges from 2 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 85 percent. The litter is 0- to 5-inches thick. The horizon is 5- to 23-inches thick.

Subsoil:

Hue ranges from 7.5YR to 2.5Y; value ranges from 3 to 7; chroma ranges from 3 to 6. Texture is sandy loam, loam, loamy fine sand, silt loam, or fine sandy loam. The content of rock fragments ranges from 0 to 85 percent. The horizon is 0- to 29-inches thick.

Substratum:

Hue is 7.5YR or 2.5Y; value ranges from 4 to 8; chroma ranges from 2 to 6. Texture is loamy sand, sand, sandy loam, loam, silt loam, or coarse sandy loam. The content of rock fragments ranges from 0 to 90 percent.

Andic Cryochrepts, loamy-skeletal, mixed

Range in Characteristics

The range of soil characteristics of Andic Cryochrepts, loamy-skeletal, mixed, is based upon 17 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 2 to 4; chroma ranges from 2 to 4. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 20 percent. The litter is 0- to 5-inches thick. The horizon is 2- to 13-inches thick.

Subsoil:

Hue ranges from 7.5YR to 2.5Y; value ranges from 3 to 7; chroma ranges from 3 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 5 to 75 percent. The horizon is 9- to 28-inches thick.

Substratum:

Hue ranges from 7.5YR to 2.5Y; value ranges from 4 to 8; chroma ranges from 2 to 6. Texture is sandy loam, loam, loamy sand, or sand. The content of rock fragments ranges from 20 to 80 percent.

Andic Cryochrepts, sandy, mixed

These soils are like the reference pedon, except the subsoil is thinner, the substratum is always sandy, and the subsoil and upper substrata have 0 to 35 percent rock fragments. These soils are associated with well-weathered granitic rocks. The lower substratum is well-weathered granitic rock in places. Well-weathered granitic rock is soft and can be dug with a spade; it restricts root and water penetration; and it rapidly breaks down to coarse sand and pea-sized gravel when exposed by excavation.

Range in Characteristics

The range of soil characteristics of Andic Cryochrepts, sandy, mixed, is based upon 23 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 2 to 4; chroma ranges from 1 to 4. Texture is silt loam, sandy loam, or loam. The content of rock fragments ranges from 0 to 15 percent. The litter is 0- to 5-inches thick. The horizon is 0- to 13-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is sandy loam, loam, or silt loam. The content of rock fragments ranges from 0 to 35 percent. The horizon is 4- to 26-inches thick.

Substratum:

Hue is 10YR; value ranges from 4 to 6; chroma ranges from 2 to 6. Texture is loamy sand or

sand. The content of rock fragments ranges from 0 to 30 percent.

Andic Cryochrepts, sandy-skeletal, mixed

These soils are like the reference pedon, except the subsoils are thinner, the substratum is always coarse textured, and the subsoils and the upper substrata have 35 percent or more rock fragments. Most soils in this family are associated with parent materials derived from quartzite, gneiss, or granitic rocks.

Range in Characteristics

The range of soil characteristics of Andic Cryochrepts, sandy-skeletal, mixed, is based upon 24 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 2 to 5; chroma ranges from 2 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 30 percent. The litter is 0- to 3-inches thick. The horizon is 2- to 17-inches thick.

Subsoil:

Hue ranges from 5YR to 10YR; value ranges from 3 to 6; chroma ranges from 3 to 6. Texture is sandy loam, loam, or silt loam. The content of rock fragments ranges from 35 to 80 percent. The horizon is 4- to 26-inches thick.

Substratum:

Hue is 10YR or 2.5Y; value ranges from 4 to 6; chroma ranges from 2 to 6. Texture is loamy sand, sand, or loamy coarse sand. The content of rock fragments ranges from 40 to 80 percent.

Andic Cryochrepts, coarse-loamy, mixed

These soils are like the reference pedon, except the subsoils and upper substrata contain 0 to 35 percent rock fragments. Andic Cryochrepts are associated with well-weathered schist and gneiss and with elevations below 6,200 feet.

Range in Characteristics

The range of soil characteristics of Andic Cryochrepts, coarse-loamy, mixed, is based upon 7 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 3 or 4; chroma ranges from 2 to 4. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 10 percent. The litter is 1- to 3-inches thick. The horizon is 3- to 13-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma is 4 or 6. Texture is loam, silt loam, or sandy loam. The content of rock fragments ranges from 0 to 35 percent. The horizon is 5- to 29-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value ranges from 4 to 7; chroma ranges from 3 to 5. Texture is sandy loam, loam, loamy sand, or silt loam. The content of rock fragments ranges from 15 to 30 percent.

Dystric Cryochrepts

Dystric Cryochrepts are Cryochrepts low in bases. These soils may have a loess surface layer that has been influenced by volcanic ash and that is too thin or too mixed to meet the Andic definition. Dystric Cryochrepts share common taxonomic boundaries in the survey area with Andic Cryochrepts, Typic Cryumbrepts, and Typic Dystrochrepts. Dystric Cryochrepts contain more material that has been influenced by volcanic ash than is normal for the class and are at the warm end of the class. Dystric Cryochrepts are used to characterize a soil component in the names of 22 map units in this survey.

Representative Pedon

Oi—1 inch to 0; undecomposed needles and twigs.

A—0 to 7 inches; brown to dark brown (10YR 4/3) gravelly sandy loam; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 15 percent fine gravel; medium acid; abrupt wavy boundary.

Bw—7 to 19 inches; brown (10YR 5/3) very gravelly sandy loam; weak medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 40 percent fine gravel; medium acid; clear wavy boundary.

C1—19 to 34 inches; yellowish brown (10YR 5/4) extremely gravelly sand; single grain; loose, nonsticky, nonplastic; few fine roots; 70 percent gravel; slightly acid; clear smooth boundary.

C2—34 to 46 inches; light yellowish brown (10YR 6/4) very gravelly sand; single grain; loose, nonsticky, nonplastic; few fine and coarse roots;

30 percent gravel, 5 percent cobbles; slightly acid; clear wavy boundary.
C3—46 to 60 inches; light yellowish brown (10YR 6/4) very gravelly sand; single grain; loose, nonsticky, nonplastic; 30 percent gravel, 5 percent cobbles; strongly acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Columbia Ridge, NW 1/4 of NE 1/4, Sec. 22, T. 27 N., R. 7 E., detailed soil map unit 31DH7. The soil profile described is a Dystric Cryochrept, sandy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is mixed with material derived from granitic rocks. This pedon described occurs midslope on a dissected mountain slope. The elevation is 5,950 feet. Slope is 55 percent, and the aspect is westerly. The habitat type is grand fir/beargrass-twinflower.

Range in Characteristics

The range of soil characteristics of Dystric Cryochrepts, sandy-skeletal, mixed, is based upon 23 detailed pedon descriptions.

Surface:
Hue is 7.5YR or 10YR; value ranges from 2 to 5; chroma ranges from 2 to 4. Texture is loam, sandy loam, or silt loam. The content of rock fragments ranges from 0 to 80 percent. The litter is 0- to 4-inches thick. The horizon is 4- to 20-inches thick.

Subsoil:
Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma ranges from 3 to 8. Texture is sandy loam, loam, or silt loam. The content of rock fragments ranges from 10 to 80 percent. The horizon is 3- to 20-inches thick.

Substratum:
Hue is 7.5YR or 2.5Y; value ranges from 4 to 6; chroma ranges from 3 to 6. Texture is sand or loamy sand. The content of rock fragments ranges from 35 to 80 percent.

Dystric Cryochrepts, loamy-skeletal, mixed

These soils are like the reference pedon, except they have thicker subsoils and sometimes have finer-textured substrata. These soils are associated with andesite, basalt, and schist.

Range in Characteristics

The range of soil characteristics of Dystric Cryochrepts, loamy-skeletal, mixed, is based upon 31 detailed pedon descriptions.

Surface:
Hue is 7.5YR or 10YR; value ranges from 2 to 4; chroma ranges from 2 to 6. Texture is silt loam, loam, or sandy loam. The content of rock fragments ranges from 0 to 75 percent. The litter is 0- to 5-inches thick. The horizon is 2- to 20-inches thick.

Subsoil:
Hue ranges from 7.5YR to 5Y; value ranges from 2 to 6; chroma ranges from 2 to 6. Texture is silt loam, loam, sandy loam, silty clay loam, or loamy fine sand. The content of rock fragments ranges from 0 to 80 percent. The horizon is 4- to 30-inches thick.

Substratum:
Hue is 10YR or 2.5Y; value ranges from 4 to 7; chroma ranges from 1 to 6. Texture is sandy loam, loam, loamy sand, silt loam, or silty clay loam. The content of rock fragments ranges from 40 to 80 percent.

Dystrochrepts

Dystrochrepts are acid Ochrepts of humid environments. These soils occur mainly at elevations below 4,000 feet on northerly aspects and 6,000 feet on southerly aspects. In this survey area, these soils are all in the frigid temperature regime. Most Dystrochrepts are in the 30- to 45-inch average annual precipitation zone. These soils are mainly formed in material derived from granitic rocks, gneiss, schist, and quartzite.

Andic Dystrochrepts

Andic Dystrochrepts are Dystrochrepts with a loess surface layer that has been influenced by volcanic ash. These surface layers are between 7- and 14-inches thick and have soil bulk densities less than 1 gram per cubic centimeter. Habitat types are in the grand fir or western red cedar series. Andic Dystrochrepts share common taxonomic boundaries in the survey area with Typic Vitrandepts, Andic Cryochrepts, and Typic Dystrochrepts. Andic Dystrochrepts are on the cold end of the class. Andic

Dystrochrepts are moderately productive forest soils. Productivity is highly dependent on the loess surface layers, and practices that compact or redistribute the loess surface layers can lower site productivity. Andic Dystrochrepts are used to characterize a soil component in the names of 8 map units in this survey.

Representative Pedon

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

A—0 to 3 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

Bs—3 to 12 inches; dark brown (7.5YR 3/4) silt loam; weak fine granular structure, soft, very friable, slightly sticky, nonplastic; many very fine, fine, and coarse roots; 5 percent gravel; medium acid; abrupt wavy boundary.

2Bw1—12 to 19 inches; brown to dark brown (10YR 4/3) loam; moderate medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common coarse roots; medium acid; clear wavy boundary.

2Bw2—19 to 34 inches; brown to dark brown (10YR 4/3) loam; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine and common medium and coarse roots; 5 percent gravel; slightly acid; clear wavy boundary.

2Bw3—34 to 42 inches; brown to dark brown (10YR 4/3) loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; few fine and common medium and coarse roots; 10 percent gravel; strongly acid; clear wavy boundary.

2C—42 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam; massive; slightly hard, friable, slightly sticky, nonplastic; few medium roots; 15 percent gravel; slightly acid.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Silver Ridge; SW 1/4, Sec. 12, T. 29 N., R. 5 E., detailed soil map unit 24C38. The soil profile described is an Andic Dystrochrept, coarse-loamy, mixed, frigid. The parent material is loess that has been influenced by volcanic ash and that is overlying material derived from well-weathered granitics. This pedon occurs on the lower side slope of a high-relief rolling upland. The elevation is 4,500 feet. Slope is 45 percent, and the aspect is northwesterly. The habitat type is grand fir/queencup beadlily.

Range in Characteristics

The range of soil characteristics of Andic Dystrochrepts, coarse-loamy, mixed, frigid, is based upon 17 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 3 or 4; chroma ranges from 2 to 6. Texture is silt loam or loam. The content of rock fragments ranges from 0 to 10 percent. The litter is 0- to 4-inches thick. The horizon is 2- to 12-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma ranges from 3 to 6. Texture is loam, sandy loam, or silt loam. The content of rock fragments ranges from 0 to 35 percent. The horizon is 10- to 30-inches thick.

Substratum:

Hue is 10YR; value ranges from 4 to 7; chroma ranges from 2 to 6. Texture is sandy loam, loam, or loamy sand. The content of rock fragments ranges from 0 to 50 percent.

Andic Dystrochrepts, sandy, mixed, frigid

These soils are like the reference pedon, except the subsoils are thinner and the substrata are always sandy. These soils are associated with well-weathered granitic rocks. The lower substrata is well-weathered granitic rock in places. Well-weathered granitic rock is soft and can be dug with a spade; it restricts root and water penetration; and it rapidly breaks down to coarse sand and pea-sized gravel when exposed by excavation.

Range in Characteristics

The range of soil characteristics of Andic Dystrochrepts, sandy, mixed, frigid, is based upon six detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 3 or 4; chroma ranges from 3 to 5. Texture is loam or silt loam. The content of rock fragments ranges from 0 to 10 percent. The litter is .5- to .6-inches thick. The horizon is 2- to 12-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value is 4 or 5; chroma ranges from 2 to 6. Texture is sandy loam, loam, or loamy sand. The content of rock

fragments ranges from 0 to 5 percent. The horizon is 5- to 25-inches thick.

Substratum:

Hue is 10YR; value ranges from 4 to 7; chroma ranges from 3 to 6. Texture is loamy sand or sand. The content of rock fragments ranges from 0 to 25 percent.

Typic Dystrochrepts

Typic Dystrochrepts are freely drained Dystrochrepts. They represent the central concept, or typical member, of the Dystrochrepts great group. These soils have loess surface layers that have been influenced by volcanic ash. These surface layers are too thin or too mixed with underlying material to qualify for Andic subgroup. Typic Dystrochrepts share common taxonomic boundaries in the survey area with Andic Dystrochrepts and Dystric Cryochrepts. Typic Dystrochrepts contain more material that has been influenced by volcanic ash than is normal for the class and are on the cold end of the class. Typic Dystrochrepts are used to characterize a soil component in the names of nine map units in this survey.

Representative Pedon

Oi—3 to 2 inches; needles and twigs.

Oe—2 inches to 0; partially decomposed litter.

A—0 to 7 inches; brown to dark brown (7.5YR 4/3) loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine and many medium and coarse roots; 5 percent gravel; neutral; clear wavy boundary.

Bw1—7 to 17 inches; brown to dark brown (7.5YR 4/3) loam; moderate medium subangular blocky structure, slightly hard, firm, slightly sticky, slightly plastic; few very fine and fine and many medium and coarse roots; 5 percent gravel; medium acid; clear wavy boundary.

Bw2—17 to 41 inches; brown to dark brown (7.5YR 4/3) gravelly sandy loam, moderate medium subangular blocky structure; slightly hard, firm, slightly sticky, nonplastic; few very fine and fine and many medium and coarse roots; 15 percent gravel; medium acid; clear wavy boundary.

C—41 to 60 inches; brown to dark brown (7.5YR 4/4) very gravelly sandy loam; massive; slightly hard, friable, slightly sticky, nonplastic; common medium and coarse roots; 40 percent gravel; neutral.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, Meadow Creek, SW 1/4, Sec. 17, T. 30 N., R. 5 E., detailed soil map unit 31D38. The soil profile described is a Typic Dystrochrept, coarse-loamy, mixed, frigid. The soils formed in material derived from quartzite and gneiss. This pedon occurs on the upper part of a dissected mountain slope. The elevation is 4,160 feet. Slope is 55 percent, and the aspect is southeasterly. The habitat type is grand fir/queencup beadlily.

Range in Characteristics

The range of soil characteristics of Typic Dystrochrepts, coarse-loamy, mixed, frigid, is based upon 29 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value ranges from 2 to 5; chroma ranges from 1 to 6. Texture is loam, sandy loam, or silt loam. The content of rock fragments ranges from 0 to 25 percent. The litter is 1- to 3.5-inches thick. The horizon is 2- to 24-inches thick.

Subsoil:

Hue ranges from 5YR to 10YR; value ranges from 3 to 5; chroma ranges from 2 to 6. Texture is sandy loam, loam, or silt loam. The content of rock fragments ranges from 0 to 30 percent. The horizon is 5- to 34-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma ranges from 3 to 6. Texture is sandy loam, loamy sand, loam, or sand. The content of rock fragments ranges from 0 to 70 percent.

Typic Dystrochrepts, loamy-skeletal, mixed, frigid

These soils are like the reference pedon, except the subsoils or upper substrata contain 35 percent or more rock fragments.

Range in Characteristics

The range of soil characteristics of Typic Dystrochrepts, loamy-skeletal, mixed, frigid, is based upon 16 detailed pedon descriptions.

Surface:

Hue ranges from 5YR to 10YR; value ranges from 3 to 5; chroma ranges from 2 to 4. Texture is loam, sandy loam, or silt loam. The content

of rock fragments ranges from 0 to 70 percent. The litter is 1- to 3-inches thick. The horizon is 0- to 20-inches thick.

Subsoil:

Hue ranges from 5YR to 10YR; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is loam or sandy loam. The content of rock fragments ranges from 10 to 80 percent. The horizon is 4- to 26-inches thick.

Substratum:

Hue is 7.5YR or 10YR; value ranges from 4 to 6; chroma ranges from 3 to 6. Texture is sandy loam or loam. The content of rock fragments ranges from 30 to 80 percent.

Typic Dystrochrepts, sandy-skeletal, mixed, frigid

These soils are like the reference pedon, except the subsoils are thinner, the substrata are always sandy, and the subsoils or upper substrata have more than 35 percent rock fragments. These soils are associated with weakly weathered hard rocks.

Range in Characteristics

The range of soil characteristics of Typic Dystrochrepts, sandy-skeletal, mixed, frigid, is based upon four detailed pedon descriptions.

Surface:

Hue is 5YR or 10YR; value is 3; chroma ranges from 2 to 4. Texture is loam, sandy loam, or loamy fine sand. The content of rock fragments ranges from 0 to 10 percent. The litter is 1- to 2-inches thick. The horizon is 4- to 8-inches thick.

Subsoil:

Hue is 10YR; value is 3 or 4; chroma is 3 or 4. Texture is loam or sandy loam. The content of rock fragments ranges from 10 to 40 percent. The horizon is 13- to 20-inches thick.

Substratum:

Hue ranges from 5YR to 2.5Y; value ranges from 3 to 5; chroma ranges from 3 to 6. Texture is loamy sand or sand. The content of rock fragments ranges from 50 to 70 percent.

Umbrepts

Umbrepts in the survey area are soils low in bases with dark-colored surface layers more than 10-inches thick. These soils do not have subsoil clay accumulations, and surface layers that have been influenced by volcanic ash are not thick enough to qualify for the Andept suborder. Below 4,000 feet elevation, Umbrepts are found on flood plains and in toeslope positions where soils have fluctuating water tables. At higher elevations, Umbrepts are also well-drained soils on steep mountain slopes and glacial trough walls under open subalpine forests or on grassy balds.

Cryumbrepts

Cryumbrepts are cold Umbrepts. These soils are usually at elevations above 4,000 feet. Most Cryumbrepts are in the 30- to 65-inch average annual precipitation zone. Cold soil temperatures and a short growing season are expected to limit plant growth. On flood plains, fluctuating water tables also limit plant growth. Cryumbrepts are used to characterize a soil component in the names of three map units in this survey. These map units are complex and variable at lower levels of classification. Subgroups of Cryumbrepts in these units include Aquic, Andic, Typic, Lithic, and Entic.

Representative Pedon

A1—0 to 7 inches; very dark brown (10YR 2/2) loam; moderate medium subangular blocky structure; hard, friable, slightly sticky, nonplastic; common very fine, fine, medium, and coarse roots; strongly acid; clear smooth boundary.

A2—7 to 15 inches; dark brown (10YR 3/3) loam; moderate medium subangular blocky structure; hard, friable, slightly sticky, nonplastic; few fine, medium, and coarse roots; strongly acid; clear wavy boundary.

Bw—15 to 28 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; hard, friable, slightly sticky, nonplastic; 5 percent gravel; strongly acid; abrupt wavy boundary.

C—28 to 60 inches; dark brown (7.5YR 4/4) stratified gravelly loamy sands and sands; few fine distinct strong brown (7.5YR 5/8) mottles; single grain; loose, nonsticky, nonplastic; 30 percent gravel; slightly acid.

Location and Setting

North Central Idaho, Idaho County, Salmon River, Nut Basin, SW 1/4, Sec. 25, T. 26 N., R. 2 E., detailed soil map unit 47A66. The soil profile described is a Typic Cryumbrept, sandy, mixed. The parent material is loess that has been influenced by volcanic ash and

that is mixed with till and alluvium derived from gneiss. This pedon is in a glacial trough bottom. The elevation is 7,160 feet. Slope is 10 percent, and the aspect is easterly. The habitat type is subalpine fir/claspleaf twisted stalk.

Range in Characteristics

The range of soil characteristics of Cryumbrepts is based upon 45 detailed pedon descriptions.

Surface:

Hue ranges from 7.5YR to 2.5Y; value is 2 or 3; chroma ranges from 1 to 3. Texture is loam, sandy loam, silt loam, or loamy fine sand. The content of rock fragments ranges from 0 to 70 percent. The litter is 0- to 14-inches thick. The horizon is 8- to 59-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma ranges from 2 to 6. Texture is sandy loam, loam, silt loam, or loamy fine sand. The content of rock fragments ranges from 0 to 80 percent. The horizon is 0- to 41-inches thick.

Substratum:

Hue ranges from 7.5YR to 5Y; value ranges from 3 to 6; chroma ranges from 2 to 6. Texture is sandy loam, loamy sand, sand, or loam. The content of rock fragments ranges from 0 to 80 percent.

Entic Cryumbrepts

Entic Cryumbrepts are Cryumbrepts that do not have a cambic horizon. They formed in coarse-textured parent materials. These soils generally are on very steep alpine glaciated landscapes. The elevation is above 6,000 feet. These soils support open subalpine forests or grassy balds. Entic Cryumbrepts share common taxonomic boundaries with Typic Cryandepts and Dystric Cryochrepts. Surface soil layers have volcanic ash influence. Entic Cryumbrepts are used to characterize a soil component in the names of four map units in this survey.

Representative Pedon

A—0 to 16 inches; very dark brown (10YR 2/2) gravelly sandy loam; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 15 percent gravel; strongly acid; abrupt smooth boundary.

AC—16 to 30 inches; dark yellowish brown (10YR 3/4) very cobbly sand; single grain; loose, nonsticky, nonplastic; few very fine, fine and common medium and coarse roots; 20 percent gravel, 30 percent cobbles; medium acid; abrupt wavy boundary.

Cr—30 to 39 inches; soft, weathered granite bedrock.

R—39 inches; hard, weakly weathered granite bedrock.

Location and Setting

North Central Idaho, Idaho County, Salmon River, Nut Basin Point, SE 1/4 of SW 1/4, Sec. 2, T. 25 N., R. 2 E., detailed soil map unit 31D77. The soil profile described is an Entic Cryumbrept, sandy-skeletal, mixed. The parent material is loess that has been influenced by volcanic ash and that is mixed with material derived from granitic rocks. This pedon occurs on the upper side slope of a dissected mountain slope. The elevation is 7,480 feet. Slope is 45 percent, and the aspect is northwesterly. The habitat type is subalpine fir/woodrush.

Range in Characteristics

The range of soil characteristics of Entic Cryumbrepts, sandy-skeletal, mixed, is based upon seven detailed pedon descriptions.

Surface:

Hue is 10YR; value is 2 or 3; chroma ranges from 1 to 3. Texture is sandy loam, loam, or loamy fine sand. The content of rock fragments ranges from 0 to 60 percent. The litter is 0- to 1-inch thick. The horizon is 11- to 22-inches thick.

Substratum:

Hue is 10YR; value ranges from 3 to 6; chroma is 2 or 4. Texture is loamy sand or sand. The content of rock fragments ranges from 40 to 80 percent.

Mollisols

Mollisols are very dark-colored soils rich in bases. Most Mollisols are below 7,000 feet elevation on gently sloping to very steep slopes. These soils mainly support grassland vegetation or open ponderosa pine forest but are also under Douglas-fir or grand fir forests. Mollisols are used to characterize a soil component in the name of three map units in this survey. These map units are complex and variable at lower levels of soil classification. Suborders include Borolls and Xerolls.

Mollisols

Representative Pedon

O—2 inches to 0; partially decomposed grass litter.
A—0 to 12 inches; very dark brown (10YR 2/2) very gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and medium roots; 25 percent gravel and 10 percent cobbles; neutral; clear irregular boundary.
Bt—12 to 47 inches; dark yellowish brown (10YR 4/4) very cobbly loam; weak fine grading to medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few faint distinct clay films on faces of peds; common fine and medium roots; 20 percent gravel and 40 percent cobbles; moderately alkaline; clear smooth boundary.
C—47 to 60 inches; dark yellowish brown (10YR 4/4) extremely gravelly loam; weak fine granular structure; very friable, nonsticky, nonplastic; very few fine roots; 60 percent gravel and 20 percent cobbles; moderately alkaline.

Location and Setting

North Central Idaho; Idaho County; Salmon River; Mackay Bar; SW 1/4, Sec. 29, T. 24 N., R. 8 E., detailed soil map unit 50CUU. The soil profile described is an Ultic Argixeroll, loamy-skeletal, mixed, mesic. The soils formed in material derived from granitic rocks. This pedon occurs on the lower slope of a landslide. The elevation is 2,500 feet. The slope is 25 percent, and the aspect is southeasterly. The plant community is grassland comparable to an Idaho fescue/bluebunch wheatgrass habitat type.

Range in Characteristics

The range of soil characteristics of Mollisols is based upon 137 detailed pedon descriptions.

Surface:
Hue ranges from 5YR to 2.5Y; value ranges from 2 to 4; chroma ranges from 1 to 3. Texture is silt loam, loam, sandy loam, silty clay loam, clay loam, or loamy fine sand. The content of rock fragments ranges from 0 to 80 percent. The litter is 0- to 4-inches thick. The horizon is 5- to 41-inches thick.

Subsoil:
Hue ranges from 5YR to 2.5Y; value ranges from 2 to 6; chroma ranges from 1 to 6. Texture is silty clay loam, silt loam, clay loam, loam, sandy loam, sandy clay loam, or loamy fine sand. The content of rock fragments ranges from 0 to 80 percent. The horizon is 4- to 34-inches thick.

Substratum:
Hue ranges from 5YR to 2.5Y; value ranges from 3 to 6; chroma ranges from 2 to 8. Texture is loamy sand, loam, silt loam, sandy loam, sand, silty clay loam, silty clay, or sandy clay loam. The content of rock fragments ranges from 0 to 80 percent.

Xerolls

Xerolls are Mollisols in climates with dry summers and moist winters. Xerolls generally occur at elevations of 1,400 to 6,000 feet on gently sloping to very steep landscapes. Average annual precipitation ranges from 15 to 45 inches.

Argixerolls

Argixerolls are Xerolls that have an accumulation of clay in the subsoil. These soils formed in material derived from basalt or andesite.

Lithic Ultic Argixerolls

Lithic Ultic Argixerolls are Argixerolls that are shallow to bedrock and have base saturation of 75 percent or less. They occur on flat to gently sloping plateaus and very steep stream breaklands. These soils share common taxonomic boundaries with Ultic Argixerolls, Lithic Haploxerolls, and Ultic Haploxerolls. Argillic horizons can be weakly expressed. Lithic Ultic Argixerolls are used to characterize a soil component in the names of three map units in this survey.

Representative Pedon

Oi—1 inch to 0; needles and grass.
A—0 to 9 inches; very dark brown (10YR 2/2) gravelly silty clay loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine, fine, and medium roots; 30 percent gravel; medium acid; clear smooth boundary.
Bt—9 to 12 inches; dark brown (10YR 3/3) very cobbly silty clay loam; moderate fine subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; common fine and medium roots; common faint clay films in root channels and on gravel; 30 percent gravel, 30 percent cobbles; medium acid.
R—12 inches; fractured basalt.

Location and Setting

North Central Idaho, Idaho County, Salmon River drainage, Free Use Ridge, SW 1/4, Sec. 24, T. 28 N., R. 2 E., detailed soil map unit 27A2J. The soil profile described is a Lithic Ultic Argixeroll, loamy-skeletal, mixed, frigid. The soils formed in material derived from weakly to moderately weathered basalt. This pedon occurs on a flat to gently sloping plateau. The elevation is 4,890 feet. The slope is 10 percent, and the aspect is northerly. The habitat type is ponderosa pine/Idaho fescue.

Range in Characteristics

The range of soil characteristics of Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid, is based upon seven detailed pedon descriptions.

Surface:

Hue is 10YR; value is 2 or 3; chroma is 2. Texture is silty clay loam, silt loam, loam, or clay loam. The content of rock fragments ranges from 20 to 60 percent. The litter is 0- to 1-inch thick. The horizon is 5- to 11-inches thick.

Subsoil:

Hue is 10YR; value is 3 or 4; chroma ranges from 2 to 4. Texture is silty clay loam or silty clay. The content of rock fragments ranges from 35 to 90 percent. The horizon is 3- to 11-inches thick.

Ultic Argixerolls

Ultic Argixerolls are Argixerolls with base saturation equal to or less than 75 percent in the upper part of the soil. They occur on plateaus and very steep stream breaklands at elevations of 1,900 to 6,000 feet. They share common taxonomic boundaries with Ultic Haploxerolls and Lithic Ultic Argixerolls. Argillic horizons can be weakly developed. The depth to bedrock can be at the shallow end of the class. Ultic Argixerolls are used to characterize a soil component in the names of 13 map units in this survey.

Representative Pedon

Oi—1 inch to 0; conifer needles and dead mosses.

A1—0 to 6 inches; very dark brown (10YR 2/2) gravelly silt loam; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine, fine, and medium roots; 20 percent andesite gravel; medium acid; clear wavy boundary.

A2—6 to 12 inches; dark brown (10YR 3/3) gravelly loam; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; common very fine, fine, medium, and coarse roots; 20 percent andesite gravel; medium acid; clear wavy boundary.

Bt—12 to 28 inches; dark yellowish brown (10YR 4/4) very gravelly clay loam; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and medium roots; few faint clay films on faces of peds and pores; 45 percent andesite gravel, 5 percent andesite cobbles; medium acid; clear smooth boundary.

C—28 to 51 inches; dark yellowish brown (10YR 4/6) extremely gravelly loam; very weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few fine and medium and common coarse roots; 60 percent andesite gravel, 20 percent andesite cobbles; neutral.

R—51 to 60 inches; well fractured bedrock with 5 percent fines in interstices.

Location and Setting

North Central Idaho, Idaho County, Salmon River drainage, Joe Creek, NE 1/4 of NE 1/4, Sec. 29, T. 27 N., R. 1 E., detailed soil map unit 31D3F. The soil profile described is an Ultic Argixeroll, loamy-skeletal, mixed, frigid. The soils formed in material derived from andesite and mixed loess that has been influenced by volcanic ash. The elevation is 3,960 feet. This pedon occurs midslope on a dissected mountain slope. Slope is 60 percent, and the aspect is northerly. The habitat type is grand fir/ninebark-ninebark.

Range in Characteristics

The range of soil characteristics of Ultic Argixerolls, loamy-skeletal, mixed, frigid, is based upon 16 detailed pedon descriptions.

Surface:

Hue is 7.5YR or 10YR; value is 2 or 3; chroma ranges from 1 to 3. Texture is silty clay loam, clay loam, loam, silt loam, or silty clay. The content of rock fragments ranges from 0 to 60 percent. The litter is 0- to 4-inches thick. The horizon is 10- to 20-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 5; chroma ranges from 1 to 4. Texture is silty clay loam, clay loam, loam, silt loam, or silty clay. The content of rock fragments ranges from 25 to 75 percent. The horizon is 12- to 35-inches thick.

Substratum:

Hue is 10YR; value is 4; chroma ranges from 3 to 6. Texture is loam, loamy sand, sandy loam, silty clay loam, or silt loam. The content of rock fragments ranges from 40 to 80 percent.

Haploxerolls

Haploxerolls are Xerolls with a cambic horizon or a layer of only slightly altered parent materials below the mollic epipedon. The soils formed in material derived from granitic rocks, gneiss, quartzite, and schist. These soils are most common on the very steep stream breaklands along the Salmon River.

Lithic Ultic Haploxerolls

Lithic Ultic Haploxerolls are Haploxerolls that are shallow to bedrock and have base saturation of 75 percent or less. They share common taxonomic boundaries with Lithic Ultic Argixerolls and Ultic Haploxerolls. These soils are at the deep end of the class. Lithic Ultic Haploxerolls are used to characterize a soil component in the names of two map units in this survey.

Representative Pedon

A—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loamy sand; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine roots; 20 percent fine gravel; slightly acid; abrupt smooth boundary.
R—7 inches; hard bedrock.

Location and Setting

North Central Idaho, Idaho County, South Fork of the Clearwater River, NE 1/4, Sec. 5, T. 28 N., R. 6 E., detailed soil map unit 61E22. This pedon is a Lithic Ultic Haploxeroll, sandy, mixed, frigid. The soils formed in material derived from granitic rocks. This pedon occurs on the lower side slope of a very steep stream breakland. The elevation is 3,370 feet. The slope is 90 percent, and the aspect is southerly. The habitat type is Douglas-fir/snowberry.

Range in Characteristics

The range of soil characteristics of Lithic Ultic Haploxerolls is based upon six detailed pedon description.

Surface:

Hue ranges from 7.5YR to 2.5Y; value is 2 or 3; chroma is 2. Texture is sandy loam, loam, loamy fine sand, or loamy sand. The content of rock fragments ranges from 0 to 70 percent. The litter is 0- to 1-inches thick. The horizon is 6- to 13-inches thick. The depth to bedrock is 6 to 16 inches.

Substratum:

Hue is 10YR or 2.5Y; value is 3 or 4; chroma is 2 or 3. Texture is loamy sand or sand. The content of rock fragments ranges from 20 to 65 percent.

Ultic Haploxerolls

Ultic Haploxerolls are Haploxerolls with base saturation of 75 percent or less throughout the upper part of the soil. They share common taxonomic boundaries with Lithic Ultic Haploxerolls and Ultic Argixerolls. These soils are shallow for their class. Ultic Haploxerolls are used to characterize a soil component in the names of five map units in this survey.

Representative Pedon

A—0 to 12 inches; very dark brown (10YR 2/2) sandy loam; moderate fine subangular blocky parting to granular; slightly hard, friable, slightly sticky, nonplastic; few fine and common very fine roots; 5 percent gravel and 5 percent cobbles; neutral; clear wavy boundary.
Bw1—12 to 18 inches; dark yellowish brown (10YR 3/4) sandy loam; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; few fine and common medium roots; 5 percent gravel; neutral, clear wavy boundary.
BC—18 to 26 inches; dark yellowish brown (10YR 3/4) very cobbly loamy sand; weak, fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots; 15 percent gravel and 25 percent cobbles; neutral; clear smooth boundary.
Cr—26 to 40 inches; dense grus.
R—40 inches; granitic bedrock.

Location and Setting

North Central Idaho, Idaho County, Salmon River, Kelly Creek, NE 1/4 of SE 1/4, Sec. 18, T, 24 N., R. 3 E., detailed soil map unit 61E14. This pedon is an Ultic Haploxeroll, sandy, mixed, frigid. The soils formed in material derived from granitic rocks at midslope on a very steep stream breakland. The

elevation is 2,160 feet. Slope is 60 percent, and the aspect is westerly. The vegetation is grassland.

Range in Characteristics

The range of soil characteristics of Ultic Haploxerolls is based upon 11 detailed pedon descriptions.

Surface:

Hue ranges from 7.5YR to 2.5Y; value is 2 or 3; chroma ranges from 1 to 3. Texture is sandy loam, loam, or loamy fine sand. The content of rock fragments ranges from 0 to 45 percent. There is no litter. The horizon is 7- to 13-inches thick.

Subsoil:

Hue is 7.5YR or 10YR; value ranges from 3 to 6; chroma ranges from 2 to 4. Texture is sandy loam, silt loam, or loamy fine sand. The content of rock fragments ranges from 5 to 70 percent. The horizon is 0- to 28-inches thick.

Substratum:

Hue ranges from 5YR to 2.5Y; value ranges from 3 to 6; chroma ranges from 2 to 6. Texture is loamy sand or sand. The content of rock fragments ranges from 0 to 65 percent.

Formation of the Soils

There are five principal factors of soil formation: parent material, topography, biological activity, climate, and time. The soil-forming factors are interdependent, each modifying the effects of the others.

Soil is the result of the combined effects of these five factors, and soil differences are due principally to the relative importance or strength of the various factors. In mountainous areas such as the Nez Perce National Forest Area, changes in one or more soil-forming factors are within relatively short distances. Microclimates strongly influence soil formation and change with elevation, cold air drainage, topography, slope gradient, and aspect. Complexity of parent material, topography, and time also influence the kinds of soil in the area.

There are some obvious relationships between soil properties and parent material and climate within the survey area. Many soils have a loess surface layer that has been influenced by volcanic ash. This layer tends to be thicker in the northern half of the survey area; it is also usually thicker on northerly aspects and on gentle slopes. Most of the volcanic ash came from the eruption of Mount Mazama (Crater Lake, Oregon) 6,700 years ago. Volcanic ash from other sources, such as Mount St. Helens, has been identified. Volcanic ash from other sources is usually found in relatively thin layers or as localized deposits in lower landscape positions.

The loess is dark brown where soils are well drained but can be very dark brown and black where soils are periodically saturated with water. The darker color is associated with forest openings dominated by alder and fern communities.

The lower soil layers formed in materials derived from underlying bedrock. Lower soil layers contain more angular cobbles and tend to be coarser textured with increasing elevation because there is more physical and less chemical weathering.

Many soils formed in material derived from basalt or andesite at elevations below 5,000 feet, and, on slopes less than 45 percent, these soils have argillic horizons. On slope gradients greater than 45 percent and at elevations above 5,000 feet, argillic horizons are less common.

The subsoils formed in material derived from metasedimentary rocks have very thick, well-developed argillic horizons.

The subsoils formed in glacial till derived from hard granitics, gneiss, schist, and quartzite are moderately coarse to coarse textured and contain 35 percent or more subangular to subrounded rock fragments.

The subsoils formed in alluvium on flood plains and terraces are coarse textured. Subsoils formed in alluvium adjacent to meandering streams in mountain meadows are medium textured. The soils in mountain meadows are poorly drained.

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Glossary

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.

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.

Alpine. Characteristic of high mountains above the timberline, especially mountains modified by intense glacial erosion. Implies high elevation and cold climate.

Anadromous. Term describing fish species that spend part of their life cycle in the ocean and go up rivers to spawn; characteristic of the chinook and steelhead fisheries in the survey area.

Andesite. A volcanic rock composed essentially of andesine and one or more mafic constituents such as pyroxene, hornblende, or biotite.

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. Abbreviated AUM.

Aquic moisture. A reducing regime that is virtually free of dissolved oxygen regime because the soil is saturated by ground water.

Argillic horizon. A diagnostic illuvial subsurface horizon characterized by an accumulation of silicate clays.

Ash, volcanic. Fine pyroclastic material smaller than 4.0 millimeter in diameter. In this survey area, the volcanic ash qualifies as fine ash, less than 0.25 millimeters in diameter, because it is mostly in the silt and very fine sand-size range.

Aspect. The direction in which a slope faces.

Bald. A term for an elevated, grassy area, such as a meadow on a mountain top.

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.

Basalt. An extrusive igneous rock composed primarily of calcic plagioclase and pyroxene, with or without olivine, mostly referring to the Columbia River basalt in the survey area.

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.

Basin. A depressed area with no or limited outlet.

Batholith. A large, generally discordant, plutonic mass of more than 40 square miles of surface exposure, composed predominantly of medium to coarse-grained rocks of granodiorite and quartz monzonite composition.

Bedrock. The solid material that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Breaklands. The steep to very steep broken land at the border of an upland that is dissected by ravines or canyons.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Bulk density. The mass of dry soil per unit volume, expressed in grams per cubic centimeter.

Cable logging (yarding). A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable logging 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.

Cambic horizon. A horizon that has been altered or changed by soil-forming processes, usually occurring below a diagnostic surface horizon.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high-local relief.

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.

Channel. The bed of single or braided watercourse that commonly is barren of vegetation and is formed of modern alluvium.

Cirque. Semicircular, concave, bowl-like areas that have steep faces primarily resulting from glacial ice and snow abrasion.

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.

Climax 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.

Coarse textured soil. Sand or loamy sand.

Cobble. A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

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.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Compaction. The packing together of soil particles by forces exerted at the soil surface, resulting in increased solid density.

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 an 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.

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.

Consistence, soil. The feel of the soil, and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence at various soil moisture contents are:
Wet soil—Nonsticky, slightly sticky, sticky, very sticky, nonplastic, slightly plastic, moderately plastic, very plastic.
Moist soil—Loose, very friable, friable, firm, very firm, extremely firm.
Dry soil—Loose, soft, slightly hard, hard, very hard, extremely hard.

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.

Cretaceous. The last period of the Mesozoic Era of the geologic time scale, following the Jurassic Period and preceding the Tertiary Period of the Cenozoic Era (approximately 63- to 135-million years ago.)

Creep. Slow mass movement of earth material down relatively steep slopes, primarily under influence of gravity but facilitated by water saturation and frost action.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryic. Soil temperature regime in which the mean annual soil temperature at 20 inches depth is higher than 0 degrees C but lower than 8 degrees C, and the mean summer soil temperature is lower than 8 degrees C if an O horizon is present.

Cutbanks, road. The steep slope above a road from which material has been excavated during construction.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Delineation. A single enclosed area within a drawn boundary line on a map. A single occurrence of a map unit.

Dendritic. A drainage pattern characterized by a treelike branching drainage system in which the tributaries join the main stream from all directions and at almost any angle.

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.

Deposition. The laying down of potential rock-forming materials; sedimentation.

Deranged. A poorly integrated drainage system resulting from a relatively young landform having a flat or undulating topographic surface. These forms occur on young moraines and landslides in the survey area.

Displacement. Repositioning or removal of the surface soil layers by mechanical action.

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, 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.

Drainage pattern. The spatial relationships among streams or rivers, including geographic orientation and angles of intersection of streams. These relationships are influenced by topographic relief, parent rock, and soil materials.

Draw. A small stream valley, generally more open and with broader bottomland than a ravine or gulch.

Droughty. An area or soil that characteristically has either a prolonged or chronic lack of available water.

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.

Erodibility. The tendency of a soil to be detached and carried away.

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 hazard. An interpretation of the risk of erosion associated with a specified management practice.

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.

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.

Fill, road. A structure, often composed largely of borrowed soil and rock materials, that forms the foundation upon which a road surface is constructed.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. Fill slope commonly is on the downhill side of a road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Flow. A mass movement of unconsolidated material that exhibits a mass move, or a continuity of motion and a plastic or semifluid behavior resembling a viscous fluid. The mass of material moved by a flow.

Forb. Any herbaceous plant not a grass or a sedge.

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).

Frigid. A soil temperature regime in which the soil at 20 inches depth has a mean temperature of 0 to 8 degrees C, and mean summer soil temperatures equal to or greater than 8 degrees C.

Frost pocket. Accumulation of cold air in a topographic low or depression leading to unseasonable occurrence of frost.

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.

Glacial. Of or relating to the presence and activities of ice and glaciers, as glacial erosion. Pertaining to distinctive features and materials produced by or derived from glaciers and ice sheets, as glacial lakes. Pertaining to an ice age or region of glaciation.

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 and unstratified glacial drift, generally unconsolidated, deposited directly by a glacier without subsequent reworking by water from the glacier and consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

Glaciation. The formation, movement, and recession of glaciers or ice sheets. A collective term for the geologic processes of glacial activity, including erosion and deposition, and the resulting effects of such action on the earth's surface.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Gneiss. A coarse-grained metamorphic rock in which bands rich in granular minerals alternate with bands in which minerals having flaky or elongate prismatic habits predominate.

Granite. A plutonic rock in which quartz constitutes 10 to 50 percent of the felsic components and in which alkali feldspar constitutes 65 to 90 percent of total feldspar.

Granitic. A class of igneous rocks in which crowding causes the constituent crystals to be visible to the unaided eye. Granitics are nonglassy in appearance and approximately of the same size.

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.

Ground water. Water filling all the unblocked pores of the material below the water table.

Grus. Material consisting of angular, coarse-grained fragments resulting from the granular disintegration of crystalline rocks.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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.

Headwall. The steep slope at the head of a valley; especially the rock cliff at the back of a cirque.

Herbage. The total production of grasses, forbs, and shrubs available to livestock.

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.

Holocene. The second epoch of the Quaternary Period of geologic time, extending from the end of the Pleistocene Epoch (about 10- to 12- thousand years ago) to the present.

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.

Hummock. A rounded or conical mound or knoll, hillock, or other small elevation. Also, a slight rise of ground above a level surface.

Humus. The well-decomposed, more or less stable, part of the organic matter in mineral soils.

Hydrothermal. Of or pertaining to heated water; the action of heated water or the products of such action.

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.

Inclusion. Soil or vegetative bodies found within a map unit not extensive enough to be mapped separately or as part of a complex.

Intrusive. Denoting igneous rocks derived from molten matter (magmas) that invaded preexisting rocks and cooled below the surface of the earth.

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.

Landform. Any physical, recognizable form, or feature of the earth's surface having a characteristic shape and produced by natural causes. Landforms used in this survey are described under *Physiography* in the "General Nature of the Survey Area" section.

Landscape. All of the natural features, such as fields, hills, forests, and water, that distinguish one part of the earth's surface from another part. Also, the distinct association of landforms, especially as modified by geologic forces, that can be seen in a single view.

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.

Limestone. A sedimentary rock consisting chiefly (more than 50%) of calcium carbonate, primarily in the form of calcite.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Livestock forage. The percent of total herbage that is palatable to domestic livestock.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Map unit. The set of areas delineated on a map considered similar to all other members of the set (delineations) with respect to the selected properties used to define the set.

Mass wasting. Dislodgment and downslope transport of earth (regolith and rock) material as a unit under direct gravitational stress. The

process includes slow displacements, such as creep and solifluction, and rapid movements such as landslides, rock slides and falls, earthflows, debris flows, and avalanches. Agents of fluid transport (water, ice, air) may play a subordinate role in the process.

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.

Meander. One of a series of sinuous loops, with sine-wave form, in the course of a stream channel. Meandering streams commonly have cross sections with low width to depth ratios; fine grained, cohesive bank material; and low gradient.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesic. Soil temperature regime in which the mean annual soil temperature at 20 inches depth is equal to or greater than 8 degrees C and less than 15 degrees C, and the difference between mean summer and mean winter soil temperature is more than 5 degrees C.

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.

Metasedimentary. A sedimentary rock that shows evidence of having been subjected to metamorphism.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

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 unsorted earth and rock deposited by a glacier.

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.

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.

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.

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.

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

Overstory. The trees in a forest that form the upper crown cover.

Parallel. In the survey area, a local drainage pattern in which drainage pattern tributaries are parallel to one another and join the mainstream at right angles, characteristic of steeply sloping landforms and high energy streams.

Parent material. The unconsolidated organic and mineral material in which soil forms.

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.

Periglacial. Pertaining to processes, conditions, areas, climate, and topographic features occurring at the immediate margins of former and

existing glaciers and ice sheets and influenced by cold temperature of the ice.

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

Permian. Last period of the Paleozoic Era, following the Pennsylvanian Period and preceding the Triassic Period of the Mesozoic Era (approximately 230- to 280-million years ago.)

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Pinnate. A modified dendritic drainage pattern in which tributaries intersect mainstreams at angles that are only slightly acute upstream.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Pleistocene. The first epoch of the Quaternary Period of geologic time, following the Tertiary Pliocene Epoch and preceding the Holocene (approximately from two-million to ten-thousand years ago.)

Precambrian. First era of geologic time (approximately 600- to 4,700-million years ago.)

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.

Puddling. Destruction of natural soil structure by agitation with water.

Quartz monzonite. A granitic rock in which quartz comprises 10 to 50 percent of the light-colored minerals and in which alkali feldspar comprises 35 to 65 percent of total feldspar.

Quartzite. Relatively hard rocks derived from metamorphosed sandstone.

Quaternary. The second period of the Cenozoic Era of geologic time, extending from the end of the Tertiary Period (about 2-million years ago) to the present and comprising two epochs, the Pleistocene (Ice Age) and Holocene (Recent).

Range or Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and areas that support certain forb and shrub communities.

Ravel. The movement of individual soil or gravel particles down a slope by gravitational force.

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

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.

Relief. The elevations or inequalities of a land surface, considered collectively.

Resident. Term describing fish species in the survey area that spend their entire life cycle in local stream systems.

Ridge. A long narrow elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys.

Riparian area. An area within 100 horizontal feet of live water, or an area that supports plants or animals requiring free water.

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 fall. Fall of cobble-size and larger rocks from steep cutslopes onto the road surface.

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.

Rock structure. A weathered rock material in which the constituent parts remain in the same position with the same orientation as in the original rock.

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.

Rutting. Furrows made in road surfaces by the passage of wheeled vehicles over wet and plastic materials.

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.

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.

Schist. A medium- or coarse-grained metamorphic rock with subparallel orientation of the micaceous minerals that dominate its composition.

Sediment. Solid clastic material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice, or mass-wasting and has come to rest on the earth's surface either above or below sea level.

Sediment delivery. The relative ease with which sediment produced in an efficiency landscape reaches stream channels within the same landscape. Sediment delivery is the qualitative equivalent of the sediment-delivery ratio, which is the ratio of the sediment reaching streams to the amount eroded within a drainage area.

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.

Seral. A plant species or community that is replaced by another species or community as succession progresses.

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.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

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.

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.

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.

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.

Slough. Small landslides involving less than 10 cubic yards of material that detach from road cutslopes and fall on the road ditch and on the running surface.

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

Solar insolation. Sum total of all long wave and shortwave radiation intercepted by a slope.

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.

Stones. Rock fragments 10 to 24 inches in diameter if rounded, or 6 to 15 inches in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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 order. In a drainage basin network, the smallest unbranched tributaries are designated stream order 1; the confluence of two first-order streams produces a stream segment of order 2; the junction of two second-order streams produces a stream segment of order 3; etc. The order of a drainage basin is determined by the highest integer.

Stream terrace. (See Terrace, stream.)

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), *granular* (rounded), *structureless* (soils are either single grain or massive).

Subalpine. Characteristic of high mountains just below the timberline.

Subgrade. The upper part of a roadfill upon which the road surfacing components are placed.

Subsoil. Technically, the B horizon; roughly, the part of the solum below the surface soil.

Substratum. The part of the soil below the solum; the C horizon.

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."

Taxonomic unit. A defined class at any categorical

level in the soil classification system. The soil names for map units refer to taxonomic units.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terrace, stream. 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.

Tertiary. The first period of the Cenozoic Era of geologic time, following the Mesozoic Era and preceding the Quaternary (approximately from 65- to 2-million years ago).

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."

Till, glacial. (See Glacial till.)

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.

Topography. The relative position and elevations of the natural or man-made features of an area that describe the configurations of its surface. Livestock forage available from typically forested lands during the period of seral grass, forb, and shrub growth following timber harvest or fire.

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.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Triassic. First period of the Mesozoic Era, following the Permian Period of the Paleozoic Era and preceding the Jurassic Period of the Mesozoic Era (approximately 181- to 230-million years ago.)

Trough wall. Side slopes of elongate, U-shaped valleys produced by glacial activity.

Udic. A soil that, in the moisture control section of the soil profile, is not dry in any part for as long as 90 days (cumulative) in most years and is not dry in all parts for as long as 45 consecutive days in the 4 months that follow the summer solstice in 6 or more years out of 10.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Undifferentiated. A map unit made up of two or more soils that could be mapped individually but that are mapped as one unit because similar interpretations can be made for use and management. Soil occurrence is not required to have a regular pattern within each delineation.

Upland. The elevated land above the low areas along streams or between hills; land above the footslope zone of the hillslope continuance.

Valley. An elongate, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.

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.

Volcanic. Pertaining to (1) the deep-seated (igneous) processes by which magma and associated gases rise through the crust and are extruded onto the earth's surface and into the atmosphere, and (2) the structure, rocks, and landforms produced.

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.

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.

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.,

Table 1. Mean Monthly Precipitation

(Recorded in the period 1968-1981 at Elk City)

Month	Mean Precipitation (Inches)
January	3.8
February	2.6
March	2.5
April	2.6
May	2.8
June	2.7
July	1.3
August	1.6
September	1.8
October	2.0
November	2.7
December	3.6
Total	30.0

Table 2. Features Used to Plot Map Unit Delineation Boundaries

(Absence of an entry indicates data were not estimated.)

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
10A99	Stream bottoms	0-10	Alluvial deposits	Sedge meadows	All	4,000-7,600	0
10AD9	Stream bottoms	0-10	Alluvial deposits	Wet forest and sedge meadows	All	4,000-7,500	0
10AUU	Mine spoils and flood plains	0-10	Alluvial deposits	—	All	—	0
13AUU	Terraces and alluvial fans	5-30	Alluvial deposits	—	All	1,400-3,300	0
22A31	Low relief rolling uplands	10-35	Granitic rocks	Mixed coniferous forest	All	3,300-5,600	0
22A33	Low relief rolling uplands	10-35	Granitic rocks and Tertiary sediments	Mixed coniferous and wet forest	All	3,300-5,300	0
22A3C	Low relief rolling uplands	10-30	Tertiary sediments and metasedimentary rocks	Mixed coniferous forest	All	3,200-5,000	0
22A41	Low relief rolling uplands	10-40	Granitic rocks	Moist, mixed coniferous forest	All	3,600-5,000	0
22A4R	Low relief rolling uplands	10-30	Basalt	Moist, mixed coniferous forest	All	3,000-4,400	0
22A6Q	Low relief rolling uplands	10-35	Granitic rocks and alluvial deposits	Subalpine and wet forest	All	5,800-6,300	0
22A6X	Low relief rolling uplands	10-40	Granitic rocks	Subalpine forest	All	5,900-6,200	0
22A8B	Low relief rolling uplands	10-35	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	All	4,800-6,200	0
22AH5	Low relief rolling uplands	10-30	Granitic rocks	Cold, mixed coniferous forest	All	4,800-6,200	0
22AH6	Low relief rolling uplands	0-35	Granitic rocks and alluvial deposits	Cold, mixed coniferous and wet forest	All	5,000-6,400	0
22AHQ	Low relief rolling uplands	10-40	Granitic rocks and alluvial deposits	Cold, mixed coniferous and wet forest	All	5,300-6,400	0

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
22AHR	Low relief rolling uplands	5-25	Basalt	Cold, mixed coniferous forest	All	4,500-6,200	0
22AHX	Low relief rolling uplands	10-35	Granitic rocks	Cold, mixed coniferous forest	All	5,300-6,000	0
24A3N	High relief rolling uplands	10-40	Granitic rocks	Mixed coniferous forest	All	3,500-4,800	0
24AH5	High relief rolling uplands	10-35	Granitic rocks	Cold, mixed coniferous forest	All	4,800-6,300	0
24C33	High relief rolling uplands	25-45	Granitic rocks and alluvial deposits	Mixed coniferous and wet forest	All	4,000-5,000	0
24C38	High relief rolling uplands	25-50	Granitic rocks	Mixed coniferous forest	All	3,200-5,800	0
24C3C	High relief rolling uplands	25-45	Tertiary sediments and metasedimentary rock	Mixed coniferous forest	All	2,300-5,200	0
24C41	High relief rolling uplands	25-45	Granitic rocks	Moist, mixed coniferous forest	All	1,800-5,500	0
24C65	High relief rolling uplands	25-45	Granitic rocks	Subalpine forest	All	5,600-6,800	0
24C8B	High relief rolling uplands	25-45	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	All	5,000-6,400	0
24CH5	High relief rolling uplands	25-50	Granitic rocks	Cold, mixed coniferous forest	All	4,600-6,600	0
24CH6	High relief rolling uplands	25-45	Granitic rocks and alluvial deposits	Cold, mixed coniferous and wet forest	All	4,600-6,000	0
24CHQ	High relief rolling uplands	25-45	Granitic rocks and alluvial deposits	Cold, mixed coniferous and wet forest	All	4,400-6,100	0
24CHX	High relief rolling uplands	25-50	Granitic rocks	Cold, mixed coniferous forest	All	5,200-6,500	0
27A2J	Plateaus	10-25	Rhyolitic rocks and basalt	Open, dry coniferous forest	All	4,000-5,900	0
27A3F	Plateaus	10-25	Basalt	Dry, mixed coniferous forest	All	3,300-5,100	0

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
31C1E	Dissected mountain slopes	30-45	Rhyolitic rocks and basalt	Grassland	Southerly	1,900-5,300	0
31C24	Dissected mountain slopes	25-45	Granitic rocks	Open, dry coniferous forest	Southerly	2,800-5,800	0
31C2E	Dissected mountain slopes	30-50	Rhyolitic rocks and basalt	Open, dry coniferous forest	Southerly	2,300-5,000	0
31C38	Dissected mountain slopes	25-50	Granitic rocks	Mixed coniferous forest	All	3,800-5,600	0
31C3C	Dissected mountain slopes	25-45	Metasedimentary rocks and Tertiary sediments	Mixed coniferous forest	All	3,700-5,000	0
31C3F	Dissected mountain slopes	25-45	Rhyolitic rocks and basalt	Dry, mixed coniferous forest	Northerly	3,100-5,400	
31C3R	Dissected mountain slopes	25-50	Basalt	Mixed coniferous forest	All	3,800-4,800	0
31C41	Dissected mountain slopes	25-50	Granitic rocks	Moist, mixed coniferous forest	All	1,700-4,800	0
31C65	Dissected mountain slopes	30-45	Granitic rocks	Subalpine forest	All	5,800-7,200	0
31C8B	Dissected mountain slopes	25-45	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	Northerly	4,500-6,600	0
31CH5	Dissected mountain slopes	25-50	Granitic rocks	Cold, mixed coniferous forest	All	5,000-6,800	0
31D14	Dissected mountain slopes	30-60	Granitic rocks	Grassland	Southerly	1,900-6,000	0
31D1E	Dissected mountain slopes	45-60	Rhyolitic rocks and basalt	Grassland	Southerly	2,200-6,800	0
31D24	Dissected mountain slopes	45-60	Granitic rocks	Open, dry coniferous forest	Southerly	2,600-6,500	0
31D38	Dissected mountain slopes	45-60	Granitic rocks	Mixed coniferous forest	All	1,900-5,500	0
31D3F	Dissected mountain slopes	45-60	Basalt	Dry, mixed coniferous forest	All	4,000-6,200	0

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
31D48	Dissected mountain slopes	45-60	Granitic rocks	Moist, mixed coniferous forest	All	1,600-5,000	0
31D67	Dissected mountain slopes	45-60	Granitic rocks	Subalpine forest	All	5,700-7,400	0
31D77	Dissected mountain slopes	40-60	Granitic rocks	Open subalpine forest	All	6,200-8,100	20
31D8B	Dissected mountain slopes	40-60	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	Northerly	4,200-6,200	0
31DH7	Dissected mountain slopes	45-60	Granitic rocks	Cold, mixed coniferous forest	All	5,500-6,600	0
31DHP	Dissected mountain slopes	40-60	Rhyolitic rocks and basalt	Cold, mixed coniferous forest	All	5,100-8,000	0
32A65	Mountain slopes	10-30	Granitic rocks	Subalpine forest	All	5,800-6,800	0
32A66	Mountain slopes	15-35	Granitic rocks and alluvial deposits	Cold, mixed coniferous and wet forest	Northerly	5,200-6,600	0
32A8B	Mountain slopes	10-30	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	All	4,800-6,400	0
32AH5	Mountain slopes	10-30	Granitic rocks	Cold, mixed coniferous forest	All	5,000-6,400	0
32AHP	Mountain slopes	10-40	Rhyolitic rocks, basalt, and limestone	Cold, mixed coniferous forest	All	4,800-6,700	0
32C65	Mountain slopes	25-45	Granitic rocks	Subalpine forest	All	5,600-7,300	0
32C8B	Mountain slopes	25-50	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	All	4,800-6,600	0
32CH5	Mountain slopes	25-50	Granitic rocks	Cold, mixed coniferous forest	All	4,600-7,100	0
32CHP	Mountain slopes	30-45	Rhyolitic rocks and basalt	Cold, mixed coniferous forest	All	5,000-7,100	0
33A65	Mountain ridges	5-30	Granitic rocks	Subalpine forest	All	5,800-7,500	0
33A67	Mountain ridges	10-30	Granitic rocks	Open subalpine forest	All	6,000-8,100	0
33C65	Mountain ridges	30-45	Granitic rocks	Subalpine forest	All	5,800-7,500	0
33C6P	Mountain ridges	20-45	Rhyolitic rocks	Subalpine forest	All	5,800-8,400	0
33C77	Mountain ridges	20-45	Granitic rocks	Open subalpine forest	All	6,200-8,200	20

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
33CA7	Mountain ridges	10-50	Granitic and rhyolitic rocks	Grassy balds	All	5,600-8,300	0
36A66	Nivational hollows	10-35	Granitic rocks and alluvial deposits	Subalpine and wet forest	All	5,200-7,200	0
36C66	Nivational hollows	25-45	Granitic rocks and alluvial deposits	Subalpine and wet forest	All	5,200-7,200	0
41E67	Glacial cirques	40-100	Granitic and rhyolitic rocks	Subalpine and open subalpine forest	All	5,600-8,300	40
42D67	Glacial cirques	40-60	Granitic rocks and glacial till	Subalpine and open subalpine forest	All	5,400-7,800	0
42E67	Glacial cirques	60-80	Granitic rocks	Subalpine and open subalpine forest	All	6,000-7,400	0
46A66	Moraines	10-35	Glacial till	Subalpine and wet forest	All	5,700-7,900	0
46AH5	Moraines	10-30	Glacial till	Subalpine forest	All	4,500-7,600	0
46AHC	Moraines	10-30	Glacial till	Mixed coniferous forest	All	4,800-5,500	0
46C65	Moraines	25-45	Glacial till	Cold, mixed coniferous and subalpine forest	All	4,700-7,800	0
46C66	Moraines	25-45	Glacial till	Subalpine and wet forest	All	4,800-7,400	0
46D67	Moraines	45-60	Glacial till	Cold, mixed coniferous and subalpine forest	All	4,300-7,200	0
46D6P	Moraines	40-60	Glacial till	Cold, mixed coniferous forest and grassy balds	All	4,300-7,200	0
47A66	Glacial trough bottoms and cirque basins	0-25	Glacial till	Subalpine and wet forest	All	3,800-7,400	0
47A6P	Glacial trough bottoms and cirque basins	5-40	Glacial till	Subalpine and cold, mixed coniferous forest	All	4,500-7,700	0
48C65	Glacial trough walls	25-50	Granitic rocks and glacial till	Cold, mixed coniferous and subalpine forest	All	4,800-7,400	0
48C6P	Glacial trough walls	30-45	Rhyolitic rocks and glacial till	Subalpine and open subalpine forest	All	5,600-8,100	0

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
48D67	Glacial trough walls	40-60	Granitic rocks and glacial till	Subalpine and open subalpine forest	All	5,600-7,600	0
48DH7	Glacial trough walls	40-60	Granitic rocks and glacial till	Cold, mixed coniferous and subalpine forest	All	4,800-7,200	0
48DHP	Glacial trough walls	45-60	Rhyolitic rocks and glacial till	Cold, mixed coniferous and subalpine forest	All	4,600-7,800	0
48E67	Glacial trough walls	60-80	Granitic rocks and glacial till	Cold, mixed coniferous and subalpine forest	All	4,400-7,800	30
48E6P	Glacial trough walls	60-80	Rhyolitic rocks and glacial till	Cold, mixed coniferous and subalpine forest	All	4,500-8,000	30
48E77	Glacial trough walls	60-90	Granitic rocks and glacial till	Open subalpine forest	Southerly	5,600-8,200	40
50CUU	Landslide deposits	20-50	Weathered rocks	——	All	1,400-6,800	0
50EUU	Landslide deposits	45-80	Weathered rocks	——	All	1,400-6,800	0
60E1E	Undissected stream breaklands	50-70	Rhyolitic rocks and basalt	Grassland	Southerly	3,600-6,000	0
60E3F	Undissected stream breaklands	50-70	Rhyolitic rocks and basalt	Dry, mixed coniferous forest	Northerly	3,600-6,000	0
60E48	Undissected stream breaklands	50-80	Granitic rocks	Moist, mixed coniferous forest	All	1,700-5,200	0
60E67	Undissected stream breaklands	50-70	Granitic rocks	Subalpine and open subalpine forest	All	5,400-7,900	0
61E12	Dissected stream breaklands	80-100	Granitic rocks	Grassland	Southerly	1,900-6,600	40
61E14	Dissected stream breaklands	60-90	Granitic rocks	Grassland	Southerly	1,800-5,400	20
61E1E	Dissected stream breaklands	50-80	Rhyolitic rocks and basalt	Grassland	All	2,000-6,200	20
61E1J	Dissected stream breaklands	60-100	Rhyolitic rocks and basalt	Grassland	Southerly	2,100-5,800	40

Table 2. Features Used to Plot Map Unit Delineation Boundaries--Continued

Map Unit Symbol	Landform	Slope	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop
		Pct				*Ft*	*Pct*
61E22	Dissected stream breaklands	70-100	Granitic rocks	Open, dry coniferous forest	Southerly	2,000-6,400	40
61E24	Dissected stream breaklands	60-90	Granitic rocks	Open, dry coniferous forest	Southerly	1,600-6,400	20
61E2E	Dissected stream breaklands	50-80	Rhyolitic rocks and basalt	Open, dry coniferous forest	Southerly	2,200-5,600	20
61E2J	Dissected stream breaklands	60-100	Rhyolitic rocks and basalt	Open, dry coniferous forest	Southerly	2,200-6,400	50
61E32	Dissected stream breaklands	60-100	Granitic rocks	Mixed coniferous and dry, mixed coniferous forest	All	1,800-6,600	40
61E38	Dissected stream breaklands	60-90	Granitic rocks	Mixed coniferous forest	All	1,600-5,500	0
61E3F	Dissected stream breaklands	50-70	Rhyolitic rocks and basalt	Dry, mixed coniferous forest	All	3,000-6,600	0
61E48	Dissected stream breaklands	60-90	Granitic rocks	Moist, mixed coniferous forest	Northerly	1,400-5,000	0
61E67	Dissected stream breaklands	60-80	Granitic rocks	Subalpine forest	All	5,200-7,200	30
61E8B	Dissected stream breaklands	60-80	Granitic rocks	Cold, mixed coniferous forest and moist forest openings	All	5,000-6,600	0
61EH7	Dissected stream breaklands	60-80	Granitic rocks	Cold, mixed coniferous forest	All	4,200-7,200	0
61EHP	Dissected stream breaklands	50-70	Rhyolitic rocks and basalt	Cold, mixed coniferous forest	All	4,600-8,200	0
61ENZ	Dissected stream breaklands	—	—	—	—	—	>50
63E1J	Breakland drainage heads	50-80	Rhyolitic rocks and basalt	Grassland	All	3,600-6,400	40
63E38	Breakland drainage heads	45-80	Granitic rocks	Mixed coniferous forest	All	3,400-6,500	0

Table 3. Soil Taxonomic Units by Map Unit

(Only map units containing soil are listed.)

Map Unit Symbol	Family or Higher Taxonomic Classification
10A99	Cryaquepts Cryumbrepts
10AD9	Cryumbrepts Cryaquepts Andic Cryochrepts
10AUU	Entisols
13AUU	Mollisols Inceptisols Alfisols
22A31	Andic Dystrochrepts, coarse-loamy, mixed, frigid
22A33	Andic Dystrochrepts, coarse-loamy, mixed, frigid Aquepts
22AC3	Eutric Glossoboralfs, fine-loamy, mixed
22A41	Typic Vitrandepts, medial over loamy, mixed, frigid
22A4R	Eutric Glossoboralfs, fine-loamy, mixed
22A6Q	Andic Cryochrepts, sandy, mixed Cryaquepts
22A6X	Andic Cryochrepts, sandy, mixed
22A8B	Entic Cryandepts, medial over loamy, mixed Typic Cryandepts, medial over loamy, mixed
22AH5	Andic Cryochrepts, loamy-skeletal, mixed
22AH6	Andic Cryochrepts, loamy-skeletal, mixed Cryaquepts
22AHQ	Andic Cryochrepts, sandy, mixed Cryaquepts
22AHR	Andeptic Cryoboralfs, loamy-skeletal, mixed
22AHX	Andic Cryochrepts, sandy, mixed
24A3N	Andic Dystrochrepts, sandy, mixed, frigid
24AH5	Andic Cryochrepts, coarse-loamy, mixed
24C33	Andic Dystrochrepts, coarse-loamy, mixed, frigid Aquepts
24C38	Andic Dystrochrepts, coarse-loamy, mixed, frigid Typic Dystrochrepts, coarse-loamy, mixed, frigid
24C3C	Eutric Glossoboralfs, loamy-skeletal, mixed
24C41	Typic Vitrandepts, medial over loamy, mixed, frigid
24C65	Andic Cryochrepts, sandy-skeletal, mixed
24C8B	Entic Cryandepts, medial over loamy, mixed Typic Cryandepts, medial over loamy, mixed

Table 3. Soil Taxonomic Units by Map Unit--Continued

Map Unit Symbol	Family or Higher Taxonomic Classification
24CH5	Andic Cryochrepts, sandy-skeletal, mixed
24CH6	Andic Cryochrepts, sandy-skeletal, mixed Cryaquepts
24CHQ	Andic Cryochrepts, sandy, mixed Cryaquepts
24CHX	Andic Cryochrepts, sandy, mixed
27A2J	Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid Ultic Argixerolls, loamy-skeletal, mixed, frigid
27A3F	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31C1E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31C24	Ultic Haploxerolls
31C2E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31C38	Andic Dystrochrepts, coarse-loamy, mixed, frigid Typic Dystrochrepts, coarse-loamy, mixed, frigid
31C3C	Eutric Glossoboralfs, loamy-skeletal, mixed
31C3F	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31C3R	Eutric Glossoboralfs, loamy-skeletal, mixed
31C41	Andic Dystrochrepts, coarse-loamy, mixed, frigid
31C65	Andic Cryochrepts, sandy-skeletal, mixed
31C8B	Entic Cryandepts, medial over loamy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed
31CH5	Andic Cryochrepts, loamy-skeletal, mixed
31D14	Ultic Haploxerolls
31D1E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31D24	Ultic Haploxerolls
31D38	Typic Dystrochrepts, coarse-loamy, mixed, frigid Andic Dystrochrepts, coarse-loamy, mixed, frigid
31D3F	Ultic Argixerolls, loamy-skeletal, mixed, frigid
31D48	Typic Dystrochrepts, coarse-loamy, mixed, frigid Typic Vitrandepts, medial over loamy, mixed, frigid
31D67	Dystric Cryochrepts, sandy-skeletal, mixed
31D77	Entic Cryumbrepts, sandy-skeletal, mixed
31D8B	Entic Cryandepts, medial over loamy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed
31DH7	Andic Cryochrepts, sandy-skeletal, mixed Dystric Cryochrepts, sandy-skeletal, mixed
31DHP	Dystric Cryochrepts, loamy-skeletal, mixed
32A65	Andic Cryochrepts, sandy-skeletal, mixed

Table 3. Soil Taxonomic Units by Map Unit--Continued

Map Unit Symbol	Family or Higher Taxonomic Classification
32A66	Andic Cryochrepts, sandy-skeletal, mixed Cryaquepts
32A8B	Entic Cryandepts, medial over loamy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed
32AH5	Entic Cryandepts, medial over loamy-skeletal, mixed
32AHP	Mollic Cryoboralfs, loamy-skeletal, mixed
32C65	Entic Cryandepts, medial over sandy or sandy-skeletal, mixed
32C8B	Entic Cryandepts, medial over loamy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed
32CH5	Andic Cryochrepts, sandy-skeletal, mixed
32CHP	Dystic Cryochrepts, loamy-skeletal, mixed
33A65	Andic Cryochrepts, loamy-skeletal, mixed
33A67	Andic Cryochrepts, sandy-skeletal, mixed
33C65	Andic Cryochrepts, sandy-skeletal, mixed
33C6P	Dystric Cryochrepts, loamy-skeletal, mixed
33C77	Typic Cryandepts, medial over sandy or sandy-skeletal, mixed
33CA7	Typic Cryandepts, medial over sandy or sandy-skeletal, mixed
36A66	Andic Cryochrepts, sandy-skeletal, mixed Cryaquepts
36C66	Andic Cryochrepts, sandy-skeletal, mixed Cryaquepts
41E67	Cryochrepts
42D67	Andic Cryochrepts, sandy-skeletal, mixed Dystric Cryochrepts, sandy-skeletal, mixed
42E67	Dystric Cryochrepts, sandy-skeletal, mixed Entic Cryumbrepts, sandy-skeletal, mixed
46A66	Andic Cryochrepts, loamy-skeletal, mixed Cryaquepts
46AH5	Entic Cryandepts, medial over loamy-skeletal, mixed
46AHC	Eutric Glossoboralfs, loamy-skeletal, mixed
46C65	Andic Cryochrepts, sandy-skeletal, mixed Dystric Cryochrepts, sandy-skeletal, mixed
46C66	Andic Cryochrepts, sandy-skeletal, mixed Cryaquepts
46D67	Dystric Cryochrepts, sandy-skeletal, mixed
46D6P	Dystric Cryochrepts, loamy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed
47A66	Cryandepts Cryumbrepts

Table 3. Soil Taxonomic Units by Map Unit--Continued

Map Unit Symbol	Family or Higher Taxonomic Classification
47A6P	Dystric Cryochrepts, loamy-skeletal, mixed
48C65	Andic Cryochrepts, sandy-skeletal, mixed
48C6P	Dystric Cryochrepts, loamy-skeletal, mixed
48D67	Dystric Cryochrepts, sandy-skeletal, mixed Entic Cryumbrepts, sandy-skeletal, mixed
48DH7	Dystric Cryochrepts, sandy-skeletal, mixed Entic Cryandepts, medial over sandy or sandy-skeletal, mixed
48DHP	Dystric Cryochrepts, loamy-skeletal, mixed
48E67	Dystric Cryochrepts, sandy-skeletal, mixed
48E6P	Dystric Cryochrepts, loamy-skeletal, mixed
48E77	Entic Cryumbrepts, sandy-skeletal, mixed
50CUU	Inceptisols Mollisols Alfisols
50EUU	Inceptisols Mollisols
60E1E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
60E3F	Ultic Argixerolls, loamy-skeletal, mixed, frigid
60E48	Typic Dystrochrepts, coarse-loamy, mixed, frigid Typic Vitrandepts, medial over loamy, mixed, frigid
60E67	Dystric Cryochrepts, sandy-skeletal, mixed Entic Cryandepts, medial over sandy-skeletal, mixed
61E12	Lithic Ultic Haploxerolls
61E14	Ultic Haploxerolls
61E1E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
61E1J	Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid
61E22	Lithic Ultic Haploxerolls
61E24	Ultic Haploxerolls
61E2E	Ultic Argixerolls, loamy-skeletal, mixed, frigid
61E2J	Ultic Argixerolls, loamy-skeletal, mixed, frigid
61E32	Typic Dystrochrepts, sandy-skeletal, mixed, frigid
61E38	Typic Dystrochrepts, coarse-loamy, mixed, frigid
61E3F	Ultic Argixerolls, loamy-skeletal, mixed, frigid
61E48	Typic Dystrochrepts, coarse-loamy, mixed, frigid Typic Vitrandepts, medial over loamy, mixed, frigid
61E67	Dystric Cryochrepts, sandy-skeletal, mixed
61E8B	Dystric Cryochrepts, sandy-skeletal, mixed Typic Cryandepts, medial over loamy-skeletal, mixed

Table 3. Soil Taxonomic Units by Map Unit--Continued

Map Unit Symbol	Family or Higher Taxonomic Classification
61EH7	Dystric Cryochrepts, sandy-skeletal, mixed
61EHP	Dystric Cryochrepts, loamy-skeletal, mixed
63E1J	Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid
63E38	Typic Dystrochrepts, loamy-skeletal, mixed, frigid

Table 4. Timber Management and Productivity

(Only map units with a forested component are listed. Absence of an entry indicates data were not estimated.)

Management Limitations				Productivity					
Map Unit Symbol	Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Forest Vegetative Group	Production Cu Ft/ Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
10AD9---	Wet areas in lower areas	Wet areas and frost pockets in lower areas	Severe	30	Subalpine forest	37-5	—	Subalpine fir	—
								Lodgepole pine	47-1
					Wet forest	40-33	—	Lodgepole pine	62
								Engelmann spruce	64-10
10AUU.									
13AUU.									
22A31---	Soil damage	Moisture stress on southerly aspects	Slight	0	Mixed coniferous forest	52-2	152-6	Grand fir	—
								Douglas-fir	73-1
								Western larch	—
								Ponderosa pine	78-2
22A33---	Soil damage Wet areas in moist draws	Moisture stress on southerly aspects Wet areas in moist draws	Slight	10	Mixed coniferous forest	52-2	152-6	Grand fir	—
								Douglas-fir	73-1
								Lodgepole pine	65-1
								Western larch	—
								Engelmann spruce	68-6
					Wet forest	40-33	—	Grand fir	—
								Lodgepole pine	62
								Engelmann spruce	73-4
22A3C---	Soil damage	Moisture stress on southerly aspects	Moderate	0	Mixed coniferous forest	52-2	152-6	Grand fir	—
								Douglas-fir	73-1
								Ponderosa pine	78-2
								Western larch	—
22A41---	Soil damage	Competition	Slight	0	Moist mixed coniferous forest	75-17	157-47	Grand fir	—
								Western red cedar	—
								Douglas-fir	77-2
								Western larch	—
22A4R---	Soil damage	Competition	Moderate	0	Moist mixed coniferous forest	75-17	157-47	Grand fir	—
								Western red cedar	—
								Douglas-fir	77-2
22A6Q---	Soil damage Wet areas in moist draws	Moisture stress Wet areas and frost pockets in moist draws	Moderate	10	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Subalpine fir	—
					Wet forest	40-33	—	Lodgepole pine	62
								Engelmann spruce	73-4
								Subalpine fir	—
22A6X---	Soil damage	Frost pockets Moisture stress	Moderate	0	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Subalpine fir	—
22A8B---	Soil damage	Competition Moist openings	Moderate	30	Cold mixed coniferous forest	51-3	161-6	Douglas-fir	70-2
								Lodgepole pine	55-2
								Grand fir	—
								Subalpine fir	—
								Engelmann spruce	65-2

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Productivity: Forest Vegetative Group	Production Cu Ft/Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
22AH5---	Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Lodgepole pine	55-2
								Engelmann spruce	65-2
								Douglas-fir	70-2
								Western larch	——
22AH6---	Soil damage	Moisture stress	Slight	10	Cold mixed	51-3	161-6	Grand fir	——
	Wet areas in moist draws	on southerly aspects			coniferous forest			Lodgepole pine	55-2
								Engelmann spruce	65-2
		Wet areas and						Douglas-fir	70-2
		frost pockets in moist draws			Wet forest	40-33	——	Grand fir	——
								Lodgepole pine	62
								Engelmann spruce	73-4
								Douglas-fir	69
22AHQ---	Soil damage	Moisture stress	Slight	10	Cold mixed	51-3	161-6	Engelmann spruce	65-2
	Wet areas in moist draws	Wet areas and frost pockets in moist draws			coniferous forest			Lodgepole pine	55-2
								Grand fir	——
								Western larch	——
								Douglas-fir	70-2
					Wet forest	40-33	161-6	Engelmann spruce	73-4
								Lodgepole pine	55-2
								Grand fir	——
								Subalpine fir	——
22AHR---	Soil damage	Moisture stress on southerly aspects	Moderate	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Engelmann spruce	65-2
								Western larch	——
								Douglas-fir	70-2
								Subalpine fir	——
								Lodgepole pine	55-2
								Ponderosa pine	65-4
22AHX---	Soil damage	Moisture stress	Slight	0	Cold mixed coniferous forest	51-3	161-6	Lodgepole pine	55-2
								Subalpine fir	——
								Engelmann spruce	65-2
								Grand fir	——
								Western larch	——
								Douglas-fir	70-2
24A3N---	Soil damage	Moisture stress on southerly aspects	Slight	0	Mixed coniferous forest	52-2	152-6	Grand fir	——
								Western larch	——
								Douglas-fir	73-1
								Ponderosa pine	78-2
								Engelmann spruce	68-6
24AH5---	Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Lodgepole pine	55-2
								Engelmann spruce	65-2
								Douglas-fir	70-2
								Western larch	——
24C33---	Complex slopes	Moisture stress	Slight	10	Mixed	52-2	152-6	Grand fir	——
	Soil damage	on southerly aspects			coniferous forest			Western larch	——
	Wet areas in moist draws	Wet areas and frost pockets in moist draws			Wet forest	40-33	——	Douglas-fir	73-1
								Grand fir	——
								Lodgepole pine	65-1
								Engelmann spruce	68-6

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Management Limitations: Regeneration	Management Limitations: Erosion Hazard	Productivity: Non-Forest	Productivity: Forest Vegetative Group	Productivity: Production Cu Ft/Ac/Yr	Productivity: Basal Area Ft/Ac	Productivity: Common Trees	Productivity: Site Index
				Pct					
24C38---	Complex slopes Soil damage on northerly aspects	Moisture stress on southerly aspects	Slight*	0	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Western larch Ponderosa pine Engelmann spruce Lodgepole pine	—— 73-1 —— 78-2 68-6 65-1
24C3C---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Western larch Ponderosa pine Engelmann spruce Lodgepole pine	—— 73-1 —— 78-2 68-6 65-1
24C41---	Complex slopes Soil damage	Competition	Slight	0	Moist mixed coniferous forest	75-17	157-14	Grand fir Western red cedar Douglas-fir Western larch	—— —— 77-2 ——
24C65---	Complex slopes Soil damage	Frost pockets Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir Douglas-fir Engelmann spruce Lodgepole pine	—— 65-4 62-3 47-1
24C8B---	Complex slopes Soil damage	Competition Moist openings	Slight	30	Cold mixed coniferous forest	51-3	161-6	Grand fir Subalpine fir Engelmann spruce Lodgepole pine Douglas-fir	—— —— 65-2 55-2 70-2
24CH5---	Complex slopes Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	161-6	Grand fir Douglas-fir Lodgepole pine Western larch Engelmann spruce	—— 70-2 55-2 —— 65-2
24CH6---	Complex slopes Soil damage Wet areas in moist draws	Moisture stress on southerly aspects Wet areas and frost pockets in moist draws	Slight	10	Cold mixed coniferous forest Wet forest	51-3 40-33	161-6 ——	Grand fir Subalpine fir Engelmann spruce Lodgepole pine Douglas-fir Western larch Grand fir Subalpine fir Engelmann spruce Lodgepole pine	—— —— 65-2 55-2 70-2 —— —— —— 73-4 62
24CHQ---	Complex slopes Soil damage Wet areas in moist draws	Moisture stress on southerly aspects Wet areas and frost pockets in moist draws	Slight	10	Cold mixed coniferous forest Wet forest	51-3 40-33	161-6 ——	Grand fir Subalpine fir Lodgepole pine Engelmann spruce Western larch Douglas-fir Grand fir Subalpine fir Lodgepole pine Engelmann spruce	—— —— 55-2 65-2 —— 70-2 —— —— 62 73-4

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Management Limitations				Productivity					
Map Unit Symbol	Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Forest Vegetative Group	Production Cu Ft/ Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
24CHX---	Complex slopes Soil damage	Moisture stress	Slight	0	Cold mixed coniferous forest	51-3	161-6	Lodgepole pine Engelmann spruce Douglas-fir Western larch Grand fir Subalpine fir	55-2 65-2 70-2 — — —
27A2J---	None	Moisture stress	Moderate	0	Open dry coniferous forest	34-6	65-20	Ponderosa pine	74-4
27A3F---	None	Moisture stress Competition	Moderate	0	Dry mixed coniferous forest	52-2	152-6	Douglas-fir Ponderosa pine	73-1 78-2
31C24---	Complex slopes	Moisture stress	Moderate	0	Open dry coniferous forest	34-6	65-20	Ponderosa pine Douglas-fir	74-4 70-2
31C2E---	Complex slopes	Moisture stress	Moderate	0	Open dry coniferous forest	34-6	65-20	Ponderosa pine Douglas-fir	74-4 70-2
31C38---	Complex slopes Soil damage on northerly aspects	Moisture stress on southerly aspects	Slight*	0	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Western larch Ponderosa pine	— 73-1 — 78-2
31C3C---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Ponderosa pine Western larch	— 73-1 78-2 —
31C3F---	Complex slopes	Moisture stress Competition	Moderate	0	Dry mixed coniferous forest	52-2	152-6	Douglas-fir Ponderosa pine	73-1 78-2
31C3R---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Ponderosa pine	— 73-1 78-2
31C41---	Complex slopes Soil damage	Competition	Slight	0	Moist mixed coniferous forest	75-17	157-47	Grand fir Western red cedar Douglas-fir Western larch	— — 77-2 —
31C65---	Complex slopes Soil damage	Moisture stress on southerly aspects	Slight	0	Subalpine forest	37-5	125-11	Subalpine fir Lodgepole pine Engelmann spruce	— 47-1 62-3
31C8B---	Complex slopes Soil damage	Competition Moist openings	Slight	30	Cold mixed coniferous forest	51-3	152-6	Grand fir Subalpine fir Engelmann spruce Lodgepole pine Douglas-fir	— — 65-2 55-2 70-2

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Management Limitations				Productivity					
Map Unit Symbol	Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Forest Vegetative Group	Production Cu Ft/ Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
31CH5---	Complex slopes Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	152-6	Grand fir	—
								Engelmann spruce	65-2
								Western larch	—
								Lodgepole pine	55-2
								Subalpine fir	—
								Douglas-fir	70-2
31D24---	Slope	Moisture stress	Moderate	30	Open dry coniferous forest	34-6	65-20	Ponderosa pine	74-4
								Douglas-fir	70-2
31D38---	Slope Soil damage	Moisture stress and insolation on southerly aspects	Moderate**	0	Mixed coniferous forest	52-2	153-6	Grand fir	—
								Douglas-fir	73-1
								Western larch	—
								Ponderosa pine	78-2
31D3F---	Slope	Moisture stress and insolation on southerly aspects Competition	Moderate	0	Dry mixed coniferous forest	52-2	152-6	Douglas-fir	73-1
								Ponderosa pine	78-2
31D48---	Slope Soil damage on northerly aspects	Competition Insolation on southerly aspects	Moderate**	0	Moist mixed coniferous forest	75-17	157-47	Grand fir	—
								Western red cedar	—
								Douglas-fir	77-2
								Western larch	—
31D67---	Slope	Moisture stress and insolation on southerly aspects	Severe	10	Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3
31D77---	Slope	Harsh climate	Severe	40	Open subalpine forest	<20	30	Whitebark pine	—
								Subalpine fir	—
								Engelmann spruce	—
								Lodgepole pine	30
31D8B---	Slope Soil damage on northerly aspects	Competition Moist openings	Slight	30	Cold mixed coniferous forest	51-3	152-6	Grand fir	—
								Subalpine fir	—
								Engelmann spruce	65-2
								Lodgepole pine	55-2
								Douglas-fir	70-2
31DH7---	Slope Soil damage on northerly aspects	Moisture stress and insolation on southerly aspects	Slight*	10	Cold mixed coniferous forest	51-3	161-6	Grand fir	—
								Subalpine fir	—
								Douglas-fir	70-2
								Western larch	—
								Engelmann spruce	65-2
								Lodgepole pine	55-2
31DHP---	Slope	Moisture stress Insolation on southerly aspects	Moderate	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	—
								Engelmann spruce	65-2
								Douglas-fir	70-2
32A65---	Soil damage	Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Productivity: Forest Vegetative Group	Production Cu Ft/Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
32A66---	Soil damage Wet areas in moist draws	Moisture stress on southerly aspects Wet areas and frost pockets in moist draws	Moderate	10	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Lodgepole pine	55-2
								Subalpine fir	——
								Engelmann spruce	65-2
								Douglas-fir	70-2
					Wet forests	40-33	——	Grand fir	——
								Lodgepole pine	62
								Subalpine fir	——
								Engelmann spruce	73-4
32A8B---	Soil damage	Competition Moist openings Moisture stress	Slight	30	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Subalpine fir	——
								Engelmann spruce	65-2
								Lodgepole pine	55-2
								Douglas-fir	70-2
32AH5---	Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Engelmann spruce	65-2
								Lodgepole pine	55-2
								Subalpine fir	——
								Western larch	——
								Douglas-fir	70-2
32AHP---	None	Moisture stress	Moderate	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Douglas-fir	70-2
								Engelmann spruce	65-2
								Western larch	——
								Lodgepole pine	55-2
32C65---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	——
								Engelmann spruce	62-3
								Lodgepole pine	47-1
32C8B---	Complex slopes Soil damage	Competition Moist openings	Slight	30	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Subalpine fir	——
								Engelmann spruce	65-2
								Lodgepole pine	55-2
								Douglas-fir	70-2
32CH5---	Complex slopes Soil damage	Moisture stress on southerly aspects	Slight	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Engelmann spruce	65-2
								Subalpine fir	——
								Lodgepole pine	55-2
								Douglas-fir	70-2
								Western larch	——
32CHP---	Complex slopes	Moisture stress	Moderate	0	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Engelmann spruce	65-2
								Douglas-fir	70-2
								Subalpine fir	——
								Lodgepole pine	55-2
33A65---	Soil damage	Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	——
								Lodgepole pine	47-1
								Engelmann spruce	62-3

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Regeneration	Erosion Hazard	Productivity: Non-Forest	Forest Vegetative Group	Production Cu Ft/Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
33A67---	Soil damage	Harsh climate	Moderate	10	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
33C65---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3
33C6P---	Complex slopes	Moisture stress	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	—
								Engelmann spruce	62-3
								Lodgepole pine	47-1
33C77---	Complex slopes Soil damage	Harsh climate	Moderate	30	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
36A66---	Soil damage Wet areas on lower slopes	Moisture stress southerly aspects	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	—
								Engelmann spruce	62-3
								Lodgepole pine	47-1
		Wet areas and frost pockets on lower slopes						Douglas-fir	65-4
					Wet forest	40-33	—	Subalpine fir	—
								Engelmann spruce	73-4
								Lodgepole pine	62
36C66---	Complex slopes Soil damage Wet areas on lower slopes	Moisture stress on southerly aspects	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	—
								Engelmann spruce	62-3
								Lodgepole pine	47-1
		Wet areas and frost pockets on lower slopes						Grand fir	—
								Douglas-fir	65-4
					Wet forest	40-3	—	Subalpine fir	—
								Engelmann spruce	73-4
								Lodgepole pine	62
								Grand fir	—
41E67---	Slope	Harsh climate at higher elevation	—	60	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
					Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Engelmann spruce	62-3
								Subalpine fir	—
42D67---	Slope Soil damage on northerly aspects	Harsh climate at higher elevation	Severe	10	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
		Moisture stress and insolation on southerly aspects			Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3
42E67---	Slope	Harsh climate at higher elevation	Severe	10	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
		Moisture stress and insolation on southerly aspects			Subalpine forest	37-	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Productivity: Forest Vegetative Group	Production Cu Ft/Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
46A66---	Soil damage on side slopes	Moisture stress on southerly aspects	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	——
								Lodgepole pine	47-1
								Engelmann spruce	62-3
	Wet areas in moist draws	Wet areas and frost pockets in moist draws			Wet forest	40-33	——	Subalpine fir	——
								Lodgepole pine	62
								Engelmann spruce	73-4
46AH5---	Soil damage	Frost pockets Moisture stress	Slight	0	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Engelmann spruce	62-3
								Subalpine fir	——
46AHC---	Soil damage	Frost pockets Moisture stress on southerly aspects	Moderate	10	Mixed coniferous forest	52-2	152-6	Grand fir	——
								Lodgepole pine	55-2
								Ponderosa pine	65-4
								Douglas-fir	70-2
								Western larch	——
46C65---	Complex slopes Soil damage at lower elevations	Frost pockets Moisture stress at higher elevations	Moderate	20	Subalpine forest	37-5	125-11	Subalpine fir	——
								Engelmann spruce	62-3
								Lodgepole pine	47-1
					Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Douglas-fir	70-2
								Lodgepole pine	55-2
46C66---	Soil damage on side slopes	Moisture stress on southerly aspects	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	——
								Lodgepole pine	47-1
								Engelmann spruce	62-3
	Wet areas in moist draws	Wet areas and frost pockets in moist draws			Wet forest	40-33	——	Subalpine fir	——
								Lodgepole pine	62
								Engelmann spruce	73-4
46D67---	Slope	Frost pockets Moisture stress	Severe	0	Subalpine forest	37-5	125-11	Subalpine fir	——
								Engelmann spruce	62-3
								Lodgepole pine	47-1
					Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Douglas-fir	70-2
								Lodgepole pine	55-2
46D6P---	Slope	Frost pockets Moisture stress	Severe	30	Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Douglas-fir	65-4
								Lodgepole pine	55-2
47A66---	Soil damage on hummocks	Moisture stress on hummocks	Moderate	10	Subalpine forest	37-5	125-11	Subalpine fir	——
								Engelmann spruce	62-3
	Wet areas in moist draws	Wet areas and frost pockets in moist draws						Lodgepole pine	47-1
								Douglas-fir	65-4
					Wet forest	40-33	——	Subalpine fir	——
								Grand fir	——
								Lodgepole pine	47-1
47A6P---	None	Frost pockets Moisture stress	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	47-1
								Engelmann spruce	62-3
								Lodgepole pine	——
								Douglas-fir	65-4
								Western larch	——
					Cold mixed coniferous forest	51-3	161-6	Grand fir	——
								Lodgepole pine	47-1

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Management Limitations: Regeneration	Management Limitations: Erosion Hazard	Productivity: Non-Forest	Productivity: Forest Vegetative Group	Productivity: Production Cu Ft/Ac/Yr	Productivity: Basal Area Ft/Ac	Productivity: Common Trees	Productivity: Site Index
				Pct					
48C65---	Complex slopes Soil damage	Moisture stress on southerly aspects	Moderate	0	Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3
					Cold mixed coniferous forest	51-3	161-6	Grand fir	—
								Lodgepole pine	47-1
48C6P---	Complex slopes	Harsh climate at higher elevations	Moderate	10	Open subalpine forest	<20	30	Lodgepole pine	30
								Subalpine fir	—
								Whitebark pine	—
		Moisture stress on southerly aspects			Subalpine forest	37-5	125-11	Subalpine fir	—
								Engelmann spruce	62-3
								Lodgepole pine	47-1
								Grand fir	—
								Douglas-fir	65-4
48D67---	Slope	Harsh climate at higher elevations	Severe	20	Open subalpine forest	<20	30	Subalpine fir	—
								Whitebark pine	—
								Lodgepole pine	30
		Moisture stress and insolation on southerly aspects			Subalpine forest	37-5	125-11	Subalpine fir	—
								Lodgepole pine	47-1
								Engelmann spruce	62-3
								Douglas-fir	65-4
48DH7---	Slope Soil damage on northerly aspects	Moisture stress and insolation on southerly aspects	Moderate**	10	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Subalpine fir	—
								Engelmann spruce	62-3
					Cold mixed coniferous forest	51-3	161-6	Grand fir	—
								Lodgepole pine	55-2
								Douglas-fir	70-2
48DHP---	Slope	Moisture stress Insolation on southerly aspects	Moderate	10	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Engelmann spruce	62-3
								Subalpine fir	—
					Cold mixed coniferous forest	51-3	161-6	Lodgepole pine	55-2
								Grand fir	—
								Douglas-fir	70-2
48E67---	Slope	Moisture stress and insolation on southerly aspects	Severe	30	Subalpine forest	37-5	125-11	Lodgepole pine	47-1
								Subalpine fir	—
								Engelmann spruce	62-3
					Cold mixed coniferous forest	51-3	161-6	Lodgepole pine	55-2
								Douglas-fir	70-2
								Grand fir	—
								Western larch	—
48E6P---	Slope	Moistures stress and insolation on southerly aspects	Severe	30	Subalpine forest	37-5	125-11	Subalpine fir	—
								Engelmann spruce	62-3
								Lodgepole pine	47-1
					Cold mixed coniferous forest	51-3	161-6	Douglas-fir	70-2
								Grand fir	—
								Lodgepole pine	55-2
48E77---	Slope	Harsh climate	Severe	50	Open subalpine forest	<20	30	Whitebark pine	—
								Lodgepole pine	30
								Subalpine fir	—

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Map Unit Symbol	Management Limitations: Tractor Operation	Regeneration	Erosion Hazard	Productivity: Non-Forest	Forest Vegetative Group	Production Cu Ft/Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
50CUU.									
50EUU.									
60E3F---	Slope	Moisture stress Competition	Moderate	10	Dry mixed coniferous forest	52-2	152-6	Douglas-fir Ponderosa pine Grand fir Western larch	73-1 78-2 — —
60E48---	Slope Soil damage on northerly aspects	Competition Insolation on southerly aspects	Moderate**	10	Moist mixed coniferous forest	75-17	157-47	Western red cedar Grand fir Douglas-fir Western larch	— — 77-2 —
60E67---	Slope Soil damage on northerly aspects	Harsh climate at higher elevations Moisture stress at lower elevations Insolation on southerly aspects	Severe	20	Open subalpine forest Subalpine forest	<20 37-5	30 125-11	Whitebark pine Lodgepole pine Subalpine fir Subalpine fir Lodgepole pine Engelmann spruce	— 30 — — 47-1 62-3
61E22---	Slope	Moisture stress Insolation on southerly aspects	Severe	50	Open dry coniferous forest	22	65-20	Ponderosa pine Douglas-fir	74-4 70-2
61E24---	Slope	Moisture stress Insolation on southerly aspects	Moderate	30	Open dry coniferous forest	34-6	65-20	Ponderosa pine Douglas-fir	74-4 70-2
61E2E---	Slope	Moisture stress Insolation on southerly aspects	Moderate	30	Open dry coniferous forest	34-6	65-20	Ponderosa pine Douglas-fir	74-4 70-2
61E2J---	Slope	Moisture stress Insolation on southerly aspects	Severe	60	Open dry coniferous forest	34-6	65-20	Ponderosa pine Douglas-fir	74-4 70-2
61E32---	Slope	Moisture stress Insolation on southerly aspects	Severe	60	Mixed coniferous forest	52-2	152-6	Douglas-fir Ponderosa pine Grand fir Western larch	73-1 78-2 —
61E38---	Slope	Moisture stress and insolation on southerly aspects	Moderate	10	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Western larch Ponderosa pine	— 73-1 — 78-2
61E3F---	Slope	Moisture stress Insolation on southerly aspects Competition	Moderate	10	Dry mixed coniferous forest	52-2	152-6	Douglas-fir Grand fir Ponderosa pine Western larch	73-1 — 78-2 —

See footnote at end of table.

Table 4. Timber Management and Productivity--Continued

Management Limitations				Productivity					
Map Unit Symbol	Tractor Operation	Regeneration	Erosion Hazard	Non-Forest	Forest Vegetative Group	Production Cu Ft/ Ac/Yr	Basal Area Ft/Ac	Common Trees	Site Index
				Pct					
61E48---	Slope Soil damage on northerly aspects	Competition Insolation on southerly aspects	Slight*	0	Moist mixed coniferous forest	75-17	157-47	Western red cedar Grand fir Douglas-fir Western larch	—— —— 77-2 ——
61E67---	Slope	Moisture stress and insolation on southerly aspects	Severe	30	Subalpine forest	37-5	125-11	Subalpine fir Lodgepole pine Douglas-fir Engelmann spruce	—— 47-1 65-4 62-3
61E8B---	Slope	Competition Moist openings	Moderate	40	Cold mixed coniferous forest	51-3	161-6	Grand fir Subalpine fir Engelmann spruce Lodgepole pine Douglas-fir	—— —— 65-2 55-2 70-2
61EH7---	Slope	Moisture stress and insolation on southerly aspects	Moderate	10	Cold mixed coniferous forest	51-3	161-6	Grand fir Subalpine fir Douglas-fir Western larch Engelmann spruce Lodgepole pine	—— —— 70-2 —— 65-2 55-2
61EHP---	Slope	Moisture stress Insolation on southerly aspects	Moderate	10	Cold mixed coniferous forest	51-3	161-6	Grand fir Engelmann spruce Douglas-fir Subalpine fir	—— 65-2 70-2 ——
63E38---	Slope	Moisture stress and insolation on southerly aspects	Moderate	10	Mixed coniferous forest	52-2	152-6	Grand fir Douglas-fir Western larch Ponderosa pine Engelmann spruce Lodgepole pine	—— 73-1 —— 78-2 68-6 65-1

* The hazard of soil erosion is moderate on southerly aspects.

** The hazard of soil erosion is slight on northerly aspects.

Table 5. Engineering Properties and Classification

(Absence of an entry indicates data were not estimated.)

Map Unit Symbol	USDA Texture	Unified Classification	Rock Fragments >3 Inches	Percentage Passing Sieve Number--			Liquid Limit	Plasticity Index
				10	40	200		
			Pct					
10A99.								
10AD9.								
10AUU.								
13AUU.								
22A31	Gravelly sandy loam	SM	0-55	65-75	40-50	12-30	—	NP
22A33	Gravelly sandy loam, gravelly loamy sand	SM	0-10	65-75	35-50	12-20	—	NP
22A3C	Gravelly sandy clay loam	SC	0-65	55-65	50-55	12-35	25-40	5-20
22A41	Gravelly loamy coarse sand	SM	0-30	65-75	35-55	12-20	—	NP
22A4R	Very gravelly clay loam	GM-GC	0-20	55-65	55-65	5-12	10-30	3-7
22A6Q	Gravelly loamy sand, loamy sand	SM	0-30	65-75	35-55	12-20	—	NP
22A6X	Gravelly sand	SP	0	70-80	40-50	0-5	—	NP
22A8B	Gravelly sandy loam, gravelly loamy sand	SM	0-30	65-75	40-50	12-20	—	NP
22AH5	Very gravelly coarse sandy loam	SM	0-55	40-50	20-30	12-20	—	NP
22AH6	Very gravelly sandy loam, loamy sand	SM	0-65	50-60	30-40	12-20	—	NP
22AHQ	Gravelly loamy sand, loamy sand	SM	0	80-90	45-60	12-20	—	NP
22AHR	Extremely cobbly clay loam	GC	45-95	50-60	50-60	25-35	10-30	3-7
22AHX	Sand	SP	0	80-90	45-60	0-5	—	NP
24A3N	Sand	SP	0	80-90	45-60	0-5	—	NP
24AH5	Loamy sand	SM	0	80-90	45-65	12-20	—	NP
24C33	Loamy sand, gravelly loamy sand	SM	0	65-75	35-55	12-20	—	NP
24C38	Gravelly sandy loam	SM	0-50	65-75	40-50	12-20	—	NP
24C3C	Very gravelly clay loam	GC	0-30	40-50	40-50	25-35	10-30	3-7
24C41	Gravelly loamy coarse sand	SM	0-55	65-75	60-70	12-20	—	NP
24C65	Very gravelly sand	SP	0-45	50-60	40-50	0-5	—	NP
24C8B	Gravelly loamy sand	SM	0-45	50-60	30-40	12-20	—	NP
24CH5	Very gravelly loamy coarse sand	SP-SM	0-45	40-50	20-35	5-12	—	NP
24CH6	Very gravelly loamy coarse sand, loamy sand	SP-SM	0-30	40-50	20-35	5-12	—	NP

Table 5. Engineering Properties and Classification--Continued

Map Unit Symbol	USDA Texture	Unified Classification	Rock Fragments >3 Inches	Percentage Passing Sieve Number--			Liquid Limit	Plasticity Index
				10	40	200		
			Pct					
24CHQ	Gravelly sand, loamy sand	SP-SM	0-30	65-75	35-50	5-12	—	NP
24CHX	Gravelly sand	SP-SM	0-30	80-90	45-60	5-12	—	NP
27A2J	Fractured bedrock.							
	Extremely cobbly loam	GM	65-95	40-50	40-50	12-25	—	NP
27A3F	Extremely cobbly loam	GM	65-95	20-30	20-30	12-25	—	NP
31C1E	Extremely cobbly loam	GM	65-95	40-50	35-45	20-30	10-30	3-7
31C24	Very cobbly loamy sand	SP-SM	45-65	65-75	35-50	5-12	—	NP
31C2E	Extremely gravelly loam	GM	0-45	40-50	35-45	20-30	10-30	3-7
31C38	Very gravelly sand	SP-SM	0-45	40-50	20-30	5-12	—	NP
31C3C	Very gravelly sandy clay loam	SM	0-40	45-55	40-50	12-40	10-30	3-7
31C3F	Extremely cobbly silty clay loam	GC	65-95	65-75	65-75	25-45	10-30	3-7
31C3R	Extremely cobbly silty clay loam	GC	65-95	40-50	35-45	25-45	10-30	3-7
31C41	Very gravelly loamy sand	SM	15-30	50-60	30-40	12-20	—	NP
31C65	Very gravelly loamy coarse sand	SP-SM	10-55	40-50	25-35	5-12	—	NP
31C8B	Very gravelly sandy loam	SM	25-65	50-60	30-40	12-20	—	NP
31CH5	Very gravelly loamy sand	SM	10-45	55-65	30-45	12-20	—	NP
31D14	Very cobbly loamy sand	SP-SM	45-65	40-65	25-45	5-12	—	NP
31D1E	Extremely gravelly loam	GM	15-45	35-45	30-40	20-30	10-30	3-7
31D24	Very cobbly loamy sand	GP-GM	45-65	40-64	25-45	5-12	—	NP
31D38	Very gravelly sandy loam	SM	10-30	65-75	35-50	12-20	—	NP
31D3F	Extremely gravelly loam	GM	15-45	35-45	30-40	20-30	10-30	3-7
31D48	Very gravelly loamy sand, very gravelly loamy coarse sand	SP-SM	25-85	45-55	25-40	5-12	—	NP
31D67	Very gravelly sand	SP-SM	10-45	20-30	10-20	5-12	—	NP
31D77	Very cobbly sand	SP-SM	45-65	75-85	30-50	5-12	—	NP
31D8B	Very gravelly sandy loam, very gravelly loamy sand	SM	10-45	50-60	35-45	12-20	—	NP
31DH7	Very gravelly sand	SP-SM	10-45	50-60	30-40	5-12	—	NP
31DHP	Extremely gravelly loam	GM	15-45	35-45	30-40	20-30	10-30	3-7
32A65	Very gravelly loamy coarse sand	SM	10-45	55-65	30-45	12-20	—	NP
32A66	Very gravelly loamy coarse sand, loamy sand	SM	0-30	55-65	30-45	12-20	—	NP
32A8B	Very gravelly loamy sand	SM	0-15	45-55	25-40	12-20	—	NP

Table 5. Engineering Properties and Classification--Continued

Map Unit Symbol	USDA Texture	Unified Classification	Rock Fragments >3 Inches	Percentage Passing Sieve Number--			Liquid Limit	Plasticity Index
				10	40	200		
			Pct					
32AH5	Very gravelly loamy sand	SM	0-45	55-65	30-45	12-20	—	NP
32AHP	Extremely gravelly silt loam	GM	0-45	40-50	40-50	25-35	10-30	3-7
32C65	Very gravelly sand	SP-SM	0-45	45-55	25-35	5-12	—	NP
32C8B	Very cobbly sandy loam	SM	45-65	45-55	30-40	12-20	—	NP
32CH5	Very gravelly loamy coarse sand	SM	0-45	55-65	30-45	12-20	—	NP
32CHP	Extremely cobbly silt loam	GM	65-95	55-65	50-60	25-35	10-30	3-7
33A65	Very gravelly coarse sandy loam	SP-SM	15-45	40-50	20-35	5-12	—	NP
33A67	Extremely gravelly loamy coarse sand	SP-SM	10-45	30-40	20-30	5-12	—	NP
33C65	Extremely gravelly coarse sand	SP	0-45	40-50	25-35	0-5	—	NP
33C6P	Extremely cobbly silt loam	GM	65-95	50-60	50-60	25-35	10-30	3-7
33C77	Extremely gravelly sand	SP	0-45	50-60	30-40	0-5	—	NP
33CA7	Extremely gravelly sand	SP	10-45	45-55	25-35	0-5	—	NP
36A66	Very gravelly loamy coarse sand, loamy sand	SP-SM	0-45	40-50	20-35	5-12	—	NP
36C66	Very gravelly loamy coarse sand, loamy sand	SP-SM	0-45	40-50	20-35	5-12	—	NP
41E67	Extremely stony sand	GP	65-95	15-25	10-15	0-5	—	NP
42D67	Very cobbly sand	GP	45-65	40-50	25-35	0-5	—	NP
42E67	Extremely cobbly sand, very gravelly coarse sand	GP	45-95	15-25	10-15	0-5	—	NP
46A66	Very cobbly loamy sand, loamy sand	GP-SM	15-55	55-65	30-45	5-12	—	NP
46AH5	Very cobbly sandy loam	SM	45-65	65-75	40-50	12-20	—	NP
46AHC	Very gravelly sandy clay loam	SC	10-45	55-65	5 0-55	20-30	25-40	5-20
46C65	Extremely gravelly loamy coarse sand, extremely gravelly sand	SP-SM	15-55	30-40	20-30	5-12	—	NP
46C66	Very cobbly sand, loamy sand	SP-SM	0-55	50-60	30-40	5-12	—	NP
46D67	Very cobbly sand	SP-SM	10-40	50-60	30-40	5-12	—	NP
46D6P	Extremely gravelly sandy loam	SM	10-45	50-60	30-40	12-20	—	NP
47A66.								
47A6P	Extremely gravelly silt loam	GM	0-45	40-50	40-50	25-35	10-30	3-7
48C65	Extremely cobbly sand	GP	65-95	50-60	30-40	0-5	—	NP
48C6P	Extremely cobbly sandy loam	SM	65-95	40-50	25-35	12-20	—	NP
48D67	Extremely cobbly sand	GP	65-95	50-60	30-40	0-5	—	NP

Table 5. Engineering Properties and Classification--Continued

Map Unit Symbol	USDA Texture	Unified Classification	Rock Fragments >3 Inches	Percentage Passing Sieve Number--			Liquid Limit	Plasticity Index
				10	40	200		
			Pct					
48DH7	Extremely cobbly sand	GP	65-95	65-75	35-50	0-5	—	NP
48DHP	Extremely cobbly silt loam	GM	65-95	40-50	40-50	25-35	10-30	3-7
48E67	Very stony sand	GP	45-65	65-75	35-50	0-5	—	NP
48E6P	Extremely cobbly sandy loam	SM	65-90	5-15	5-15	12-20	12-20	3-7
48E77	Extremely cobbly sand	GP	65-95	55-65	30-40	0-5	—	NP
50CUU.								
50EUU.								
60E1E	Extremely cobbly loam	GM	65-95	40-50	40-50	20-30	10-30	3-7
60E3F	Extremely cobbly loam	GM	65-95	40-50	40-50	20-30	10-30	3-7
60E48	Gravelly loamy sand, gravelly loamy coarse sand	SM	0-45	65-75	35-55	12-20	—	NP
60E67	Extremely cobbly loamy sand	SM	65-95	50-60	30-40	12-20	—	NP
61E12	Fractured bedrock.							
61E14	Very cobbly loamy sand	SM	45-65	4 0-65	25-45	12-20	—	NP
61E1E	Extremely gravelly loam	GM	10-45	40-50	35-45	30-40	20-30	3-7
61E1J	Fractured bedrock.							
61E22	Fractured bedrock.							
61E24	Very cobbly loamy sand	SP-SM	30-95	40-65	25-45	5-12	—	NP
61E2E	Extremely cobbly loam	GM	65-95	40-50	35-45	20-30	10-30	3-7
61E2J	Extremely cobbly loam	GM	65-95	40-50	35-45	20-30	10-30	3-7
61E32	Very stony sand	SP	45-65	40-50	20-30	0-5	—	NP
61E38	Extremely gravelly sand	GP	10-45	40-50	25-35	0-5	—	NP
61E3F	Extremely gravelly silt loam	GM	10-45	40-50	40-50	25-35	10-30	3-7
61E48	Gravelly loamy sand, gravelly loamy coarse sand	SM	0-45	65-75	35-55	12-20	—	NP
61E67	Extremely cobbly loamy sand	SM	65-95	50-60	30-40	12-20	—	NP
61E8B	Very gravelly loamy sand	SP-SM	0-45	40-50	20-35	5-12	—	NP
61EH7	Very cobbly sand	SP-SM	45-65	40-50	20-35	5-12	—	NP
61EHP	Extremely cobbly silt loam	GM	65-95	20-30	15-25	25-35	10-30	3-7
61ENZ.								
63E1J	Fractured bedrock.							
63E38	Extremely gravelly sand	GP	10-45	50-60	30-40	0-5	—	NP

Table 6. Features Affecting Road Construction Costs

Map Unit Symbol	Slope Range	Hard Bedrock	Drainage Crossings (Per 1,000 Feet)		
			Upper Slope	Mid Slope	Lower Slope
	Pct	*Pct*			
10A99	0-10	<10	4.8	5.1	4.0
10AD9	0-10	<10	5.8	4.9	4.1
10AUU	0-10	<10	4.1	4.4	4.2
13AUU	5-30	<10	6.4	3.6	3.6
22A31	10-35	<10	1.3	1.7	1.6
22A33	10-35	<10	0.9	1.2	1.3
22A3C	10-30	<10	0.8	1.1	1.2
22A41	10-40	<10	1.4	1.5	1.5
22A4R	10-30	<10	1.4	1.3	1.3
22A6Q	10-35	<10	1.6	1.8	1.6
22A6X	10-40	<10	0.7	1.2	1.5
22A8B	10-35	<10	1.4	1.6	1.8
22AH5	10-30	<10	0.9	1.3	1.4
22AH6	10-35	<10	1.0	1.3	1.5
22AHQ	10-40	<10	1.4	1.4	1.6
22AHR	5-25	<10	0.6	0.7	0.8
22AHX	10-35	<10	0.8	1.2	1.6
24A3N	10-40	<10	2.1	2.3	2.4
24AH5	10-35	<10	1.7	1.6	1.6
24C33	25-45	<10	2.0	2.2	2.6
24C38	25-50	<10	1.8	1.8	1.8
24C3C	25-45	<10	1.5	1.6	1.6
24C41	25-45	<10	1.9	1.8	2.1
24C65	25-45	<10	0.9	1.2	2.2
24C8B	25-45	<10	1.5	2.0	2.0
24CH5	25-50	<10	1.6	1.6	2.0
24CH6	25-45	<10	2.1	2.2	2.0
24CHQ	25-45	<10	1.8	1.9	1.8
24CHX	25-50	<10	1.7	2.0	1.8
27A2J	10-25	>50	0.3	0.6	1.0
27A3F	10-25	10-50	0.2	0.4	0.7

Table 6. Features Affecting Road Construction Costs--Continued

Map Unit Symbol	Slope Range	Hard Bedrock	Drainage Crossings (Per 1,000 Feet)		
			Upper Slope	Mid Slope	Lower Slope
	Pct	*Pct*			
31C1E	30-45	10-50	0.6	1.3	1.7
31C24	25-45	<10	1.4	1.7	1.8
31C2E	30-50	10-50	1.4	2.1	2.3
31C38	25-50	<10	1.7	1.8	1.9
31C3C	25-45	<10	1.2	1.3	1.4
31C3F	25-45	10-50	0.9	1.2	1.4
31C3R	25-50	10-50	1.4	1.4	1.2
31C41	25-50	<10	1.5	1.6	2.1
31C65	30-45	<10	0.6	1.4	1.8
31C8B	25-45	<10	1.3	1.5	2.1
31CH5	25-50	<10	1.3	1.5	1.7
31D14	30-60	10-50	1.3	1.5	2.0
31D1E	45-60	10-50	2.0	2.5	2.0
31D24	45-60	10-50	2.2	2.3	2.4
31D38	45-60	<10	1.5	1.8	1.7
31D3F	45-60	10-50	1.4	1.4	1.7
31D48	45-60	<10	1.9	2.5	2.4
31D67	45-60	10-50	0.9	1.2	1.4
31D77	40-60	>50	1.0	2.0	2.5
31D8B	45-60	<10	1.4	1.7	1.9
31DH7	45-60	10-50	1.2	1.3	1.6
31DHP	40-60	10-50	0.8	0.7	1.0
32A65	10-30	<10	0.6	0.7	1.1
32A66	15-35	<10	0.9	1.0	1.1
32A8B	10-30	<10	0.8	1.1	1.4
32AH5	10-30	<10	0.6	0.8	1.2
32AHP	10-40	<10	0.9	1.0	1.3
32C65	25-45	<10	0.9	0.9	1.0
32C8B	25-50	<10	0.9	0.9	1.4
32CH5	25-50	<10	0.9	0.9	1.1
32CHP	30-45	<10	1.0	1.2	1.4

Table 6. Features Affecting Road Construction Costs--Continued

Map Unit Symbol	Slope Range	Hard Bedrock	Drainage Crossings (Per 1,000 Feet)		
			Upper Slope	Mid Slope	Lower Slope
	Pct	*Pct*			
33A65	5-30	<10	0.5	0.6	0.8
33A67	10-30	<10	0.0	0.6	0.1
33C65	30-45	<10	0.6	0.7	1.0
33C6P	20-45	10-50	0.2	0.5	0.7
33C77	20-45	10-50	0.2	0.1	0.2
33CA7	10-50	10-50	0.2	0.2	0.4
36A66	10-35	<10	1.9	1.8	2.4
36C66	25-45	<10	1.9	2.4	3.4
41E67	40->100	>50	2.0	2.4	2.9
42D67	40-60	10-50	0.0	1.0	1.1
42E67	60-80	10-50	0.5	1.0	1.6
46A66	10-35	<10	2.4	2.7	2.8
46AH5	10-30	<10	1.1	1.6	1.5
46AHC	10-30	<10	1.3	1.2	1.7
46C65	25-45	<10	1.8	1.8	2.2
46C66	25-45	<10	1.7	1.6	2.3
46D67	45-60	10-50	1.9	1.4	1.8
46D6P	40-60	10-50	1.4	1.7	1.7
47A66	0-25	<10	1.9	2.0	2.9
47A6P	5-40	<10	1.9	1.8	2.2
48C65	25-50	<10	1.2	1.1	1.0
48C6P	30-45	<10	1.4	1.2	1.0
48D67	40-60	10-50	1.5	2.1	1.9
48DH7	40-60	10-50	0.9	0.9	1.5
48DHP	45-60	10-50	1.1	1.6	1.9
48E67	60-80	>50	0.7	1.2	1.3
48E6P	60-80	>50	1.3	1.4	1.5
48E77	60-90	>50	1.2	1.5	1.5
50CUU	20-50	<10	2.9	3.2	4.2
50EUU	45-80	10-50	2.3	2.9	4.2
60E1E	50-70	10-50	1.4	1.9	1.3

Table 6. Features Affecting Road Construction Costs--Continued

Map Unit Symbol	Slope Range	Hard Bedrock	Drainage Crossings (Per 1,000 Feet)		
			Upper Slope	Mid Slope	Lower Slope
	Pct	*Pct*			
60E3F	50-70	10-50	0.4	0.3	0.3
60E48	50-80	10-50	0.7	0.9	0.9
60E67	50-70	10-50	0.3	0.3	0.4
61E12	80->100	>50	2.8	2.6	2.4
61E14	60-90	>50	1.7	2.2	2.6
61E1E	50-80	>50	2.5	2.3	2.3
61E1J	60->100	>50	2.0	3.1	2.9
61E22	70->100	>50	2.4	2.6	2.7
61E24	60-90	>50	1.6	2.0	2.2
61E2E	50-80	>50	2.1	2.2	2.0
61E2J	60->100	>50	2.0	2.6	2.9
61E32	60->100	>50	2.9	2.9	2.8
61E38	60-90	10-50	1.5	1.9	1.9
61E3F	50-70	10-50	1.7	1.9	2.0
61E48	60-90	10-50	1.6	1.7	1.7
61E67	60-80	>50	1.6	1.7	1.9
61E8B	60-80	10-50	1.3	2.2	3.3
61EH7	60-80	10-50	1.2	1.4	1.4
61EHP	50-70	10-50	1.1	1.3	1.3
61ENZ	80->100	>50	3.2	3.3	2.8
63E1J	50-80	>50	1.6	2.9	2.7
63E38	45-80	10-50	2.0	2.7	2.7

Table 7. Road Construction and Maintenance

(Absence of an entry indicates data were not estimated.)

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
10A99	Wet areas	Cutbank slough	Rutting, slippery	None
10AD9	Wet areas	Cutbank slough	Rutting, slippery	None
10AUU.				
13AUU.				
22A31	None	Cutbank erosion and ravel	Rutting	Moisture stress on southerly aspects
22A33	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	None	Moisture stress on southerly aspects
22A3C	None	Cutbank slough and erosion	Rutting, slippery	Moisture stress on southerly aspects
22A41	None	Cutbank erosion and ravel	None	None
22A4R	None	None	Rutting, slippery	None
22A6Q	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty
22A6X	None	Cutbank erosion and ravel	None	Infertile and droughty
22A8B	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	None	None
22AH5	None	Cutbank erosion and ravel	None	Moisture stress on southerly aspects
22AH6	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Moisture stress on southerly aspects
22AHQ	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
22AHR	None	None	Large stones	Moisture stress on southerly aspects
22AHX	None	Cutbank erosion and ravel	None	Infertile and droughty
24A3N	None	Cutbank erosion and ravel	None	Infertile and droughty
24AH5	None	Cutbank erosion and ravel	None	Infertile and droughty
24C33	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	None	Infertile and droughty on side slopes
24C38	None	Cutbank erosion and ravel	Rutting	Moisture stress on southerly aspects
24C3C	None	Cutbank slough and erosion	Rutting, slippery	Moisture stress on southerly aspects
24C41	None	Cutbank erosion and ravel	None	None
24C65	None	Cutbank erosion and ravel	None	Infertile and droughty
24C8B	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes
24CH5	None	Cutbank erosion and ravel	None	Infertile and droughty
24CH6	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes
24CHQ	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes
24CHX	None	Cutbank erosion and ravel	None	Infertile and droughty
27A2J	Frequent occurrence of hard rock	None	Large stones	Moisture stress
27A3F	Occasional occurrence of hard rock	None	Large stones	Moisture stress

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
31C1E	Occasional occurrence of hard rock	None	Large stones	Moisture stress
31C24	None	Cutbank erosion and ravel	Large stones	Infertile and droughty
31C2E	Occasional occurrence of hard rock	None	Rutting, slippery	Moisture stress
31C38	None	Cutbank erosion and ravel	None	Infertile and droughty
31C3C	None	Cutbank slough and erosion	Rutting, slippery	Moisture stress on southerly aspects
31C3F	Occasional occurrence of hard rock	None	Large stones	Moisture stress
31C3R	Occasional occurrence of hard rock	None	Large stones	Moisture stress on southerly aspects
31C41	None	Cutbank erosion and ravel	None	None
31C65	None	Cutbank erosion and ravel	None	Infertile and droughty
31C8B	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes
31CH5	None	Cutbank erosion and ravel	None	Infertile and droughty
31D14	Occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
31D1E	Occasional occurrence of hard rock	None	Large stones	Moisture stress
31D24	Occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
31D38	None	Cutbank erosion and ravel	None	Moisture stress on southerly aspects
31D3F	Occasional occurrence of hard rock	None	Large stones	Moisture stress on southerly aspects
31D48	None	Cutbank erosion and ravel	None	None

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
31D67	Occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
31D77	Frequent occurrence of hard rock	Cutbank erosion and ravel	Large stones	Infertile and droughty
31D8B	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	None	None
31DH7	Occasional occurrence of hard rock	Cutbank ravel	None	Infertile and droughty
31DHP	Occasional occurrence of hard rock	None	Large stones	Moisture stress
32A65	None	Cutbank erosion and ravel	None	Infertile and droughty
32A66	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	Infertile and droughty on side slopes
32A8B	None	Cutbank erosion and ravel	None	Infertile and droughty
32AH5	None	Cutbank erosion Cutbank ravel	None	Infertile and droughty
32AHP	None	None	Slippery	Moisture stress
32C65	None	Cutbank erosion and ravel	None	Infertile and droughty
32C8B	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough in moist draws	Rutting in moist draws	None
32CH5	None	Cutbank erosion and ravel	None	Infertile and droughty
32CHP	None	None	Large stones	Moisture stress
33A65	None	Cutbank erosion and ravel	None	Moisture stress on southerly aspects
33A67	None	Cutbank erosion and ravel	None	Infertile and droughty
33C65	None	Cutbank erosion and ravel	None	Infertile and droughty

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
33C6P	Occasional occurrence of hard rock	None	Large stones	Moisture stress
33C77	Occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
33CA7	Occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
36A66	Wet areas on lower slopes	Cutbank erosion and ravel on upper slopes, cutbank slough on lower slopes	Rutting on lower slopes	Infertile and droughty on upper slopes
36C66	Wet areas on lower slopes	Cutbank erosion and ravel on upper slopes, cutbank slough on lower slopes	Rutting on lower slopes	Infertile and droughty on upper slopes
41E67	Slope, frequent occurrence of hard rock	——	Large stones, rock fall	Infertile and droughty
42D67	Occasional occurrence of hard rock	Cutbank erosion and ravel	Large stones	Infertile and droughty
42E67	Slope, occasional occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Infertile and droughty
46A66	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough	Large stones	Infertile and droughty on side slopes
46AH5	None	Cutbank erosion and ravel	Large stones	Moisture stress
46AHC	None	Cutbank slough and erosion	Rutting, slippery	Moisture stress on southerly aspects
46C65	None	Cutbank slough, erosion, and ravel	None	Infertile and droughty
46C66	Wet areas in moist draws	Cutbank erosion and ravel on side slopes, cutbank slough	Large stones	Infertile and droughty on side slopes
46D67	Occasional occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones	Infertile and droughty

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
46D6P	Occasional occurrence of hard rock	Cutbank slough and ravel	Large stones	Moisture stress
47A66	Wet areas in moist draws	Cutbank erosion and ravel on hummocks, cutbank slough	Rutting	Infertile and droughty on hummocks
47A6P	None	Cutbank slough	Slippery	Moisture stress
48C65	None	Cutbank slough, erosion, and ravel	Large stones	Infertile and droughty
48C6P	None	Cutbank slough and ravel	Large stones	Moisture stress on southerly aspects
48D67	Occasional occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones	Infertile and droughty
48DH7	Occasional occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones	Infertile and droughty
48DHP	Occasional occurrence of hard rock	Cutbank slough	Large stones	Moisture stress
48E67	Slope, frequent occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones, rock fall	Infertile and droughty
48E6P	Slope, frequent occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones, rock fall	Moisture stress on southerly aspects
48E77	Slope, frequent occurrence of hard rock	Cutbank slough, erosion, and ravel	Large stones, rock fall	Infertile and droughty
50CUU.				
50EUU.				
60E1E	Slope, occasional occurrence of hard rock	None	Large stones, rock fall	Moisture stress
60E3F	Slope, occasional occurrence of hard rock	None	Rock fall	Moisture stress
60E48	Slope, occasional occurrence of hard rock	Cutbank slough, erosion, and ravel	None	None

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
60E67	Slope, occasional occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Infertile and droughty
61E12	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61E14	Slope, frequent occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Infertile and droughty
61E1E	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61E1J	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61E22	Slope, frequent occurrence of hard rock	Rock fall	Large stones	Moisture stress
61E24	Slope, frequent occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Infertile and droughty
61E2E	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61E2J	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61E32	Slope, frequent occurrence of hard rock	Cutbank ravel	Large stones, rock fall	Infertile and droughty
61E38	Slope, occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty
61E3F	Slope, occasional occurrence of hard rock	None	Slippery	Moisture stress
61E48	Slope, occasional occurrence of hard rock	Cutbank slough, erosion, and ravel	None	None

Table 7. Road Construction and Maintenance--Continued

Map Unit Symbol	Excavation	Cut and Fill Maintenance	Native Road Surface	Revegetation
61E67	Slope, frequent occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Infertile and droughty
61E8B	Slope and occasional occurrence of hard rock on side slopes	Cutbank erosion and ravel on side slopes	Rutting in moist draws	Infertile and droughty on side slopes
	Wet areas in moist draws	Cutbank slough in moist draws		
61EH7	Slope, occasional occurrence of hard rock	Cutbank erosion and ravel	Large stones, rock fall	Moisture stress on southerly aspects
61EHP	Slope, occasional occurrence of hard rock	None	Large stones, rock fall	Moisture stress
61ENZ.				
63E1J	Slope, frequent occurrence of hard rock	None	Large stones, rock fall	Moisture stress
63E38	Slope, occasional occurrence of hard rock	Cutbank erosion and ravel	None	Infertile and droughty

Table 8. Range Management and Productivity

(Absence of an entry indicates data were not estimated.)

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
10A99	None	Sedge meadows	—	—	—	—	1,500	1,500
10AD9	Short season	Wet forest	300	50	1,000	200	—	—
	Trampling damage on lower areas	Sedge meadows	1,000	800	2,200	1,800	2,500	500
10AUU.								
13AUU.								
22A31	None	Mixed coniferous forest	350	100	1,200	300	—	—
22A33	Trampling damage in moist draws	Mixed coniferous forest	350	100	1,200	300	—	—
		Wet forest	1,000	800	2,200	1,800	—	—
22A3C	None	Mixed coniferous forest	350	100	1,200	300	—	—
22A41	None	Moist mixed coniferous forest	400	100	1,200	400	—	—
22A4R	None	Moist mixed coniferous forest	400	100	1,200	400	—	—
22A6Q	Short season	Subalpine forest	300	50	1,000	200	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
22A6X	Short season	Subalpine forest	300	50	1,000	200	—	—
22A8B	Trampling damage in moist draws	Cold mixed coniferous forest	400	100	1,200	400	—	—
		Moist forest openings	—	—	—	—	2,500	500
22AH5	None	Cold mixed coniferous forest	300	100	1,000	300	—	—
22AH6	Trampling damage in moist draws	Cold mixed coniferous forest	300	100	1,000	300	—	—
		Wet forest	1,000	800	2,200	1,800	—	—
22AHQ	Trampling damage in moist draws	Cold mixed coniferous forest	300	100	1,000	300	—	—
		Wet forest	1,000	800	2,200	1,800	—	—
22AHR	None	Cold mixed coniferous forest	300	100	1,000	300	—	—
22AHX	None	Cold mixed coniferous forest	300	100	1,000	300	—	—
24A3N	None	Mixed coniferous forest	350	100	1,200	300	—	—

Table 8. Range Management and Productivity--Continued

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
24AH5	None	Cold mixed coniferous forest	300	100	1,000	300	—	—
24C33	Steep side slopes	Mixed coniferous forest	350	100	1,200	300	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
24C38	Slope	Mixed coniferous forest	350	100	1,200	300	—	—
24C3C	Slope	Mixed coniferous forest	350	100	1,200	300	—	—
24C41	Slope	Moist mixed coniferous forest	400	100	1,200	300	—	—
24C65	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
24C8B	Steep side slopes	Cold mixed coniferous forest	400	100	1,200	400	—	—
	Trampling damage in moist draws	Moist forest openings	—	—	—	—	2,500	500
24CH5	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
24CH6	Steep side slopes	Cold mixed coniferous forest	300	100	1,000	300	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
24CHQ	Slope on slopes	Cold mixed coniferous forest	300	100	1,000	300	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
24CHX	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
27A2J	None	Open dry coniferous forest	800	300	1,000	500	—	—
27A3F	None	Dry mixed coniferous forest	400	100	1,400	400	—	—
31C1E	Slope	Grassland	—	—	—	—	1,400	900
31C24	Slope	Open dry coniferous forest	1,200	700	1,800	800	—	—
31C2E	Slope	Open dry coniferous forest	1,200	700	1,800	800	—	—
31C38	Slope	Mixed coniferous forest	300	100	1,200	300	—	—
31C3C	Slope	Mixed coniferous forest	300	100	1,200	300	—	—
31C3F	Slope	Dry mixed coniferous forest	400	100	1,400	400	—	—

Table 8. Range Management and Productivity--Continued

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
31C3R	Slope	Mixed coniferous forest	300	100	1,200	300	—	—
31C41	Slope	Moist mixed coniferous forest	400	100	1,200	300	—	—
31C65	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
31C8B	Slope	Cold mixed coniferous forest	500	100	1,200	300	—	—
	Trampling damage in moist draws	Moist forest openings	—	—	—	—	2,500	500
31CH5	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
31D14	Slope	Grassland	—	—	—	—	900	700
31D1E	Slope	Grassland	—	—	—	—	1,100	800
31D24	Slope	Open dry coniferous forest	1,200	700	1,800	800	—	—
31D38	Slope	Mixed coniferous forest	350	100	1,200	300	—	—
31D3F	Slope	Dry mixed coniferous forest	400	150	1,400	400	—	—
31D48	Slope	Moist mixed coniferous forest	400	100	1,200	300	—	—
31D67	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
31D77	Slope, short season	Open subalpine forest	300	100	600	200	—	—
31D8B	Steep side slopes	Cold mixed coniferous forest	400	150	800	300	—	—
	Trampling damage in moist draws	Moist forest openings	—	—	—	—	2,500	500
31DH7	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
31DHP	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
32A65	Short season	Subalpine forest	300	50	1,000	200	—	—
32A66	Trampling damage in moist draws	Cold mixed coniferous forest	300	100	1,000	300	—	—
		Wet forest	1,000	800	2,200	1,800	—	—
32A8B	None	Cold mixed coniferous forest	400	100	1,200	300	—	—
		Moist forest openings	—	—	—	—	2,500	500
32AH5	None	Cold mixed coniferous forest	300	100	1,000	300	—	—

Table 8. Range Management and Productivity--Continued

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
32AHP	None	Cold mixed coniferous forest	300	100	1,000	300	—	—
32C65	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
32C8B	Steep side slopes	Cold mixed coniferous forest	400	100	1,200	300	—	—
	Trampling damage in moist draws	Moist forest openings	—	—	—	—	2,500	300
32CH5	Slope	Cold mixed coniferous forest	300	100	1,200	300	—	—
32CHP	Slope	Cold mixed coniferous forest	300	100	1,200	300	—	—
33A65	Short season	Subalpine forest	300	50	1,000	200	—	—
33A67	Short season	Open subalpine forest	300	100	600	200	—	—
33C65	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
33C6P	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
33C77	Slope, short season	Open subalpine forest	300	100	600	200	—	—
33CA7	Slope, short season	Grassy balds	—	—	—	—	1,000	750
36A66	Short season	Subalpine forest	300	50	1,000	200	—	—
	Trampling damage on lower slopes	Wet forest	1,000	800	2,200	1,800	—	—
36C66	Short season	Subalpine forest	300	50	1,000	200	—	—
	Steep upper slopes, trampling damage on lower slopes	Wet forest	1,000	800	2,200	1,800	—	—
41E67	Slope, short season	Subalpine and open subalpine forest	150	25	500	100	—	—
42D67	Slope, short season	Subalpine and open subalpine forest	300	50	1,000	200	—	—
42E67	Slope, short season	Subalpine and open subalpine forest	300	50	1,000	200	—	—
46A66	Short season	Subalpine forest	300	50	1,000	200	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
46AH5	Short season	Subalpine forest	300	50	1,000	200	—	—
46AHC	None	Mixed coniferous forest	300	100	1,000	300	—	—
46C65	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—

Table 8. Range Management and Productivity--Continued

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
46C66	Short season	Subalpine forest	300	50	1,000	200	—	—
	Steep side slopes, trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
46D67	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—
46D6P	Slope, short season	Cold mixed coniferous forest	300	50	—	—	—	—
		Grassy balds	—	—	—	—	1,000	750
47A66	Short season	Subalpine forest	300	50	1,000	200	—	—
	Trampling damage in moist draws	Wet forest	1,000	800	2,200	1,800	—	—
47A6P	Short season	Subalpine forest and cold mixed coniferous forest	300	50	1,000	200	—	—
48C65	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—
48C6P	Slope, short season	Subalpine and open subalpine forest	300	50	1,000	200	—	—
48D67	Slope, short season	Subalpine and open subalpine forest	300	50	1,000	200	—	—
48DH7	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—
48DHP	Slope, short season	Cold mixed coniferous and subalpine forest	300	100	1,000	300	—	—
48E67	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—
48E6P	Slope, short season	Cold mixed coniferous and subalpine forest	300	50	1,000	200	—	—
48E77	Slope, short season	Open subalpine forest	300	100	600	200	—	—
50CUU.								
50EUU.								
60E1E	Slope	Grassland	—	—	—	—	700	500
60E3F	Slope	Dry mixed coniferous forest	400	100	1,400	400	—	—
60E48	Slope	Moist mixed coniferous forest	400	100	1,200	300	—	—
60E67	Slope, short season	Subalpine and open subalpine forest	300	50	1,000	200	—	—

Table 8. Range Management and Productivity--Continued

Map Unit Symbol	Livestock Grazing Limitations	Vegetative Group(s)	Estimated Forage Productivity					
			Under Forest Canopy		Canopy Removed		Grasslands and Meadows	
			Total	Forage	Total	Forage	Total	Forage
61E12	Slope	Grassland	—	—	—	—	850	500
61E14	Slope	Grassland	—	—	—	—	1,000	750
61E1E	Slope	Grassland	—	—	—	—	850	550
61E1J	Slope	Grassland	—	—	—	—	800	500
61E22	Slope	Open dry coniferous forest	800	300	1,050	500	—	—
61E24	Slope	Open dry coniferous forest	500	200	950	450	—	—
61E2E	Slope	Open dry coniferous forest	1,200	700	1,800	800	—	—
61E2J	Slope	Open dry coniferous forest	800	300	1,000	500	—	—
61E32	Slope	Mixed coniferous and dry mixed coniferous forest	200	50	800	200	—	—
61E38	Slope	Mixed coniferous forest	350	100	1,200	300	—	—
61E3F	Slope	Dry mixed coniferous forest	400	100	1,400	400	—	—
61E48	Slope	Moist mixed coniferous forest	400	100	1,200	300	—	—
61E67	Slope, short season	Subalpine forest	300	50	1,000	200	—	—
61E8B	Slope	Cold mixed coniferous forest	350	100	600	200	—	—
		Moist forest openings	—	—	—	—	2,500	500
61EH7	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
61EHP	Slope	Cold mixed coniferous forest	300	100	1,000	300	—	—
61ENZ	Slope	—	—	—	—	—	—	—
63E1J	Slope	Grassland	—	—	—	—	300	200
63E38	Slope	Mixed coniferous forest	200	50	500	200	—	—

Table 9. Sediment from Roads

(Absence of an entry indicates data were not estimated.)

Map Unit Symbol	Hazard of Erosion	Sediment Sources		Sediment-Contributing Area (Percentage of Road Length)		
		Cutbank Slough	Cutbank Ravel	Upper Slope	Mid Slope	Lower Slope
				Pct	*Pct*	*Pct*
10A99	Very severe	Severe	Slight	100	100	100
10AD9	Very severe	Severe	Slight	100	100	100
10AUU	——	——	——	100	100	100
13AUU	——	——	——	100	100	100
22A31	Moderate	Slight	Moderate	52	68	62
22A33	Severe	Slight	Moderate	36	44	48
22A3C	Moderate	Severe	Slight	36	50	53
22A41	Severe	Slight	Moderate	54	62	60
22A4R	Moderate	Slight	Slight	100	100	100
22A6Q	Very severe	Slight	Severe	64	72	64
22A6X	Very severe	Slight	Severe	28	48	60
22A8B	Moderate	Slight	Moderate	56	64	72
22AH5	Moderate	Slight	Moderate	36	52	56
22AH6	Severe	Moderate	Moderate	40	100	100
22AHQ	Very severe	Slight	Severe	56	56	64
22AHR	Slight	Slight	Slight	23	28	30
22AHX	Very severe	Slight	Severe	32	48	64
24A3N	Very severe	Slight	Severe	84	92	96
24AH5	Severe	Slight	Moderate	68	64	64
24C33	Severe	Slight	Moderate	80	88	100
24C38	Moderate	Slight	Moderate	72	72	72
24C3C	Moderate	Severe	Slight	100	100	64
24C41	Severe	Slight	Moderate	76	72	84
24C65	Severe	Slight	Moderate	36	48	88
24C8B	Severe	Slight	Moderate	60	80	80
24CH5	Severe	Slight	Moderate	64	64	80
24CH6	Severe	Slight	Moderate	84	88	80
24CHQ	Very severe	Slight	Severe	72	100	72
24CHX	Very severe	Slight	Severe	68	80	72

Table 9. Sediment from Roads--Continued

Map Unit Symbol	Hazard of Erosion	Sediment Sources		Sediment-Contributing Area (Percentage of Road Length)		
		Cutbank Slough	Cutbank Ravel	Upper Slope	Mid Slope	Lower Slope
				Pct	*Pct*	*Pct*
27A2J	Slight	Slight	Slight	12	24	40
27A3F	Slight	Slight	Slight	8	16	28
31C1E	Slight	Slight	Slight	24	52	68
31C24	Severe	Slight	Moderate	100	100	100
31C2E	Slight	Slight	Slight	100	84	92
31C38	Severe	Slight	Moderate	68	72	100
31C3C	Moderate	Severe	Slight	48	52	56
31C3F	Slight	Slight	Slight	37	50	57
31C3R	Slight	Slight	Slight	56	100	96
31C41	Severe	Slight	Moderate	60	64	84
31C65	Severe	Slight	Moderate	24	56	72
31C8B	Moderate	Slight	Moderate	52	100	84
31CH5	Severe	Slight	Moderate	52	60	68
31D14	Severe	Slight	Moderate	52	60	68
31D1E	Slight	Slight	Slight	80	100	80
31D24	Severe	Slight	Moderate	88	92	96
31D38	Moderate	Slight	Moderate	60	72	68
31D3F	Slight	Slight	Slight	56	56	68
31D48	Severe	Slight	Moderate	76	100	96
31D67	Severe	Slight	Moderate	36	48	56
31D77	Severe	Slight	Moderate	40	80	100
31D8B	Moderate	Slight	Moderate	56	68	76
31DH7	Severe	Slight	Moderate	48	52	64
31DHP	Slight	Slight	Slight	32	28	40
32A65	Severe	Slight	Moderate	24	56	88
32A66	Severe	Slight	Moderate	36	40	44
32A8B	Severe	Slight	Moderate	32	44	56
32AH5	Severe	Slight	Moderate	24	32	48
32AHP	Slight	Slight	Slight	36	80	52
32C65	Severe	Slight	Moderate	72	72	80

Table 9. Sediment from Roads--Continued

Map Unit Symbol	Hazard of Erosion	Sediment Sources		Sediment-Contributing Area (Percentage of Road Length)		
		Cutbank Slough	Cutbank Ravel	Upper Slope	Mid Slope	Lower Slope
				Pct	*Pct*	*Pct*
32C8B	Moderate	Slight	Moderate	36	72	100
32CH5	Severe	Slight	Moderate	36	36	44
32CHP	Slight	Slight	Slight	40	48	56
33A65	Severe	Slight	Moderate	20	24	32
33A67	Severe	Slight	Moderate	0	16	4
33C65	Severe	Slight	Moderate	24	28	40
33C6P	Slight	Slight	Slight	8	20	28
33C77	Severe	Slight	Moderate	8	4	8
33CA7	Severe	Slight	Moderate	8	8	16
36A66	Severe	Slight	Moderate	100	100	100
36C66	Severe	Slight	Moderate	76	100	100
41E67	—	—	—	78	97	100
42D67	Severe	Moderate	Moderate	0	40	44
42E67	Severe	Slight	Moderate	20	40	64
46A66	Severe	Moderate	Moderate	96	100	100
46AH5	Moderate	Moderate	Moderate	44	64	60
46AHC	Moderate	Moderate	Slight	52	48	68
46C65	Severe	Moderate	Moderate	72	72	88
46C66	Severe	Moderate	Moderate	100	64	100
46D67	Severe	Moderate	Moderate	76	56	72
46D6P	Slight	Moderate	Moderate	56	68	68
47A66	Moderate	Moderate	Moderate	76	80	100
47A6P	Slight	Moderate	Slight	100	100	100
48C65	Severe	Moderate	Moderate	48	44	40
48C6P	Slight	Moderate	Moderate	56	48	40
48D67	Severe	Moderate	Moderate	60	84	76
48DH7	Severe	Moderate	Moderate	36	36	60
48DHP	Slight	Moderate	Slight	44	64	76
48E67	Severe	Severe	Moderate	28	48	52
48E6P	Slight	Moderate	Moderate	52	56	60

Table 9. Sediment from Roads--Continued

Map Unit Symbol	Hazard of Erosion	Sediment Sources		Sediment-Contributing Area (Percentage of Road Length)		
		Cutbank Slough	Cutbank Ravel	Upper Slope	Mid Slope	Lower Slope
				Pct	*Pct*	*Pct*
48E77	Severe	Moderate	Moderate	48	60	60
50CUU	——	Severe	——	100	100	100
50EUU	——	Severe	——	90	100	100
60E1E	Slight	Slight	Slight	56	76	52
60E3F	Slight	Slight	Slight	16	12	12
60E48	Severe	Severe	Moderate	28	36	36
60E67	Severe	Slight	Moderate	12	12	16
61E12	Slight	Slight	Slight	100	100	96
61E14	Severe	Slight	Moderate	68	88	100
61E1E	Slight	Slight	Slight	100	92	92
61E1J	Slight	Slight	Slight	80	100	100
61E22	Slight	Slight	Slight	96	100	100
61E24	Severe	Slight	Moderate	64	80	88
61E2E	Slight	Slight	Slight	84	88	80
61E2J	Slight	Slight	Slight	78	100	100
61E32	Severe	Slight	Moderate	100	100	100
61E38	Severe	Slight	Moderate	60	76	76
61E3F	Slight	Slight	Slight	69	76	81
61E48	Severe	Severe	Moderate	64	68	68
61E67	Severe	Slight	Moderate	64	68	76
61E8B	Severe	Slight	Moderate	52	88	100
61EH7	Severe	Slight	Moderate	48	56	56
61EHP	Slight	Slight	Slight	43	51	54
61ENZ	Slight	Slight	Slight	100	100	100
63E1J	Slight	Slight	Slight	64	100	100
63E38	Severe	Slight	Moderate	56	100	100

Table 10. Classification of the Soils

Order	Suborder	Soil Name
Alfisols		Alfisols
	Boralfs	Cryoboralfs
		Andeptic Cryoboralfs, loamy-skeletal, mixed
		Mollic Cryoboralfs, loamy-skeletal, mixed
		Glossoboralfs
		Eutric Glossoboralfs, fine-loamy, mixed
		Eutric Glossoboralfs, loamy-skeletal, mixed
Entisols		Entisols
Inceptisols		Inceptisols
	Andepts	Cryandepts
		Entic Cryandepts, medial over loamy, mixed
		Entic Cryandepts, medial over loamy-skeletal, mixed
		Entic Cryandepts, medial over sandy or sandy-skeletal, mixed
		Typic Cryandepts, medial over loamy, mixed
		Typic Cryandepts, medial over loamy-skeletal, mixed
		Typic Cryandepts, medial over sandy or sandy-skeletal, mixed
		Vitrandepts
		Typic Vitrandepts, medial over loamy, mixed, frigid
	Aquepts	Aquepts
		Cryaquepts
	Ochrepts	Cryochrepts
		Andic Cryochrepts
		Andic Cryochrepts, coarse-loamy, mixed
		Andic Cryochrepts, loamy-skeletal, mixed
		Andic Cryochrepts, sandy, mixed
		Andic Cryochrepts, sandy-skeletal, mixed
		Dystric Cryochrepts, loamy-skeletal, mixed
		Dystric Cryochrepts, sandy-skeletal, mixed
		Dystrochrepts
		Andic Dystrochrepts, coarse-loamy, mixed, frigid
		Andic Dystrochrepts, sandy, mixed, frigid
		Typic Dystrochrepts, coarse-loamy, mixed, frigid
		Typic Dystrochrepts, loamy-skeletal, mixed, frigid
		Typic Dystrochrepts, sandy-skeletal, mixed, frigid
	Umbrepts	Cryumbrepts
		Entic Cryumbrepts, sandy-skeletal, mixed
Mollisols		Mollisols
	Xerolls	Argixerolls
		Lithic Ultic Argixerolls, loamy-skeletal, mixed, frigid
		Ultic Argixerolls, loamy-skeletal, mixed, frigid
		Haploxerolls
		Lithic Ultic Haploxerolls
		Ultic Haploxerolls

Table 11. Numerical List of National Cooperative Soil Survey Map Unit Names and the Acreage of the Soils

Map Unit Symbol	National Cooperative Soil Survey Map Unit Name	Extent in Acres
10A99	Cryaquepts-Cryumbrepts complex, stream bottoms	6,901
10AD9	Cryumbrepts-Cryaquepts-Andic Cryochrepts complex, stream bottoms	8,442
10AUU	Entisols, sandy substra; Riverwash; and Dumps, mine	2,611
13AUU	Mollisols, Inceptisols, and Alfisols; terraces and alluvial fans	1,656
22A31	Andic Dystrochrepts, low relief rolling uplands	52,005
22A33	Andic Dystrochrepts-Aquepts complex, low relief rolling uplands	4,483
22A3C	Eutric Glossoboralfs, low relief rolling uplands	16,889
22A41	Typic Vitrandepts, low relief rolling uplands	8,114
22A4R	Eutric Glossoboralfs, low relief rolling uplands, basalt substratum	3,170
22A6Q	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum	10,233
22A6X	Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum	2,066
22A8B	Entic Cryandepts-Typic Cryandepts complex, low relief rolling uplands	6,240
22AH5	Andic Cryochrepts, low relief rolling uplands	29,331
22AH6	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands	13,141
22AHQ	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum, warm	8,439
22AHR	Andeptic Cryoboralfs, low relief rolling uplands	16,099
22AHX	Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum, warm	4,806
24A3N	Andic Dystrochrepts, rolling uplands, weathered granitic substratum	1,329
24AH5	Andic Cryochrepts, high relief rolling uplands	3,049
24C33	Andic Dystrochrepts-Aquepts complex, high relief rolling uplands	1,727
24C38	Andic Dystrochrepts-Typic Dystrochrepts complex, high relief rolling uplands	47,523
24C3C	Eutric Glossoboralfs, high relief rolling uplands	5,085
24C41	Typic Vitrandepts, high relief rolling uplands	11,645
24C65	Andic Cryochrepts, high relief rolling uplands	3,173
24C8B	Entic Cryandepts-Typic Cryandepts complex, high relief rolling uplands	23,930
24CH5	Andic Cryochrepts, high relief rolling uplands, warm	37,261
24CH6	Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands	6,287
24CHQ	Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands, weathered granitic substratum	8,574
24CHX	Andic Cryochrepts, high relief rolling uplands, weathered granitic substratum	10,518
27A2J	Lithic Ultic Argixerolls-Ultic Argixerolls complex, plateaus	2,136
27A3F	Ultic Argixerolls, plateaus	2,964
31C1E	Ultic Argixerolls, dissected mountain slopes, dry	1,737
31C24	Ultic Haploxerolls, dissected mountain slopes	2,255
31C2E	Ultic Argixerolls, dissected mountain slopes	6,571
31C38	Andic Dystrochrepts-Typic Dystrochrepts complex, dissected mountain slopes	41,617
31C3C	Eutric Glossoboralfs, dissected mountain slopes	5,425
31C3F	Ultic Argixerolls, dissected mountain slopes, moist	9,053
31C3R	Eutric Glossoboralfs, dissected mountain slopes, basalt substratum	1,671
31C41	Andic Dystrochrepts, dissected mountain slopes	19,406
31C65	Andic Cryochrepts, dissected mountain slopes	2,753
31C8B	Entic Cryandepts-Typic Cryandepts complex, dissected mountain slopes	17,642
31CH5	Andic Cryochrepts, dissected mountain slopes, warm	27,618
31D14	Ultic Haploxerolls, dissected mountain slopes, dry	1,346
31D1E	Ultic Argixerolls, steep dissected mountain slopes, dry	1,929
31D24	Ultic Haploxerolls, steep dissected mountain slopes	6,015
31D38	Typic Dystrochrepts-Andic Dystrochrepts complex, dissected mountain slopes	48,867
31D3F	Ultic Argixerolls, steep dissected mountain slopes	9,204
31D48	Typic Dystrochrepts-Typic Vitrandepts complex, dissected mountain slopes	26,744
31D67	Dystric Cryochrepts, dissected mountain slopes	9,481
31D77	Entic Cryumbrepts-Rock outcrop complex, dissected mountain slopes	1,497
31D8B	Entic Cryandepts-Typic Cryandepts complex, steep dissected mountain slopes	15,769
31DH7	Andic Cryochrepts-Dystric Cryochrepts complex, dissected mountain slopes	32,043
31DHP	Dystric Cryochrepts, dissected mountain slopes, basalt and andesite substratum	3,057
32A65	Andic Cryochrepts, gently sloping mountain slopes	19,513
32A66	Andic Cryochrepts-Cryaquepts complex, mountain slopes	2,221
32A8B	Entic Cryandepts-Typic Cryandepts complex, gently sloping mountain slopes	5,938
32AH5	Entic Cryandepts, gently sloping mountain slopes	34,429
32AHP	Mollic Cryoboralfs, gently sloping mountain slopes	5,003
32C65	Entic Cryandepts, moderately steep mountain slopes	23,621
32C8B	Entic Cryandepts-Typic Cryandepts complex, mountain slopes	3,388
32CH5	Andic Cryochrepts, moderately steep mountain slopes	38,047

Table 11. Numerical List of National Cooperative Soil Survey Map Unit Names and the Acreage of the Soils--Continued

Map Unit Symbol	National Cooperative Soil Survey Map Unit Name	Extent in Acres
32CHP	Dystric Cryochrepts, moderately steep mountain slopes	1,855
33A65	Andic Cryochrepts, mountain ridges	40,742
33A67	Andic Cryochrepts, mountain ridges, cold	2,437
33C65	Andic Cryochrepts, moderately steep mountain ridges	11,362
33C6P	Dystric Cryochrepts, mountain ridges	1,670
33C77	Typic Cryandepts-Rock outcrop complex, moderately steep mountain ridges	2,691
33CA7	Typic Cryandepts, moderately steep mountain ridges, dry	2,991
36A66	Andic Cryochrepts-Cryaquepts complex, nivational hollows	2,481
36C66	Andic Cryochrepts-Cryaquepts complex, moderately steep nivational hollows	2,546
41E67	Cryochrepts-Rock outcrop complex, glacial cirques	8,465
42D67	Andic Cryochrepts-Dystric Cryochrepts complex, glacial cirques	2,058
42E67	Dystric Cryochrepts-Entic Cryumbrepts complex, glacial cirques	1,506
46A66	Andic Cryochrepts-Cryaquepts complex, gently sloping moraines	12,367
46AH5	Entic Cryandepts, gently sloping moraines	2,289
46AHC	Eutric Glossoboralfs, gently sloping moraines	1,709
46C65	Andic Cryochrepts and Dystric Cryochrepts, moderately steep moraines	5,534
46C66	Andic Cryochrepts-Cryaquepts complex, moderately steep moraines	5,728
46D67	Dystric Cryochrepts, steep moraines	1,932
46D6P	Dystric Cryochrepts-Typic Cryandepts complex, steep moraines	2,691
47A66	Cryandepts-Cryumbrepts complex, glacial trough bottoms	4,518
47A6P	Dystric Cryochrepts, glacial trough bottoms	2,208
48C65	Andic Cryochrepts, glacial trough walls	4,207
48C6P	Dystric Cryochrepts, glacial trough walls	1,335
48D67	Dystric Cryochrepts-Entic Cryumbrepts complex, steep glacial trough walls	3,234
48DH7	Dystric Cryochrepts-Entic Cryandepts complex, steep glacial trough walls	1,165
48DHP	Dystric Cryochrepts, steep glacial trough walls	2,849
48E67	Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls	5,775
48E6P	Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls, andesite substratum	2,143
48E77	Entic Cryumbrepts-Rock outcrop complex, very steep glacial trough walls	2,074
50CUU	Inceptisols, Mollisols, and Alfisols, moderately steep landslide deposits	34,709
50EUU	Inceptisols and Mollisols, very steep landslide deposits	16,223
60E1E	Ultic Argixerolls, undissected stream breaklands, dry	2,086
60E3F	Ultic Argixerolls, undissected stream breaklands	1,890
60E48	Typic Dystrochrepts-Typic Vitrandepts complex, undissected stream breaklands	2,179
60E67	Dystric Cryochrepts-Entic Cryandepts complex, undissected stream breaklands	851
61E12	Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry	4,826
61E14	Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry	9,644
61E1E	Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands, dry	3,979
61E1J	Lithic Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands	8,404
61E22	Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands	8,123
61E24	Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands	44,014
61E2E	Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands	5,711
61E2J	Rock outcrop-Ultic Argixerolls complex, dissected stream breaklands	8,019
61E32	Typic Dystrochrepts-Rock outcrop complex, dissected stream breaklands	9,152
61E38	Typic Dystrochrepts, dissected stream breaklands	83,827
61E3F	Ultic Argixerolls, dissected stream breaklands, moist	21,484
61E48	Typic Dystrochrepts-Typic Vitrandepts complex, dissected stream breaklands	61,792
61E67	Dystric Cryochrepts-Rock outcrop complex, dissected stream breaklands	2,721
61E8B	Dystric Cryochrepts-Typic Cryandepts complex, dissected stream breaklands	5,803
61EH7	Dystric Cryochrepts, dissected stream breaklands, warm	12,674
61EHP	Dystric Cryochrepts, dissected stream breaklands, andesite substratum	4,651
61ENZ	Rock outcrop	3,628
63E1J	Lithic Ultic Argixerolls-Rock outcrop complex, breakland drainageway heads	613
63E38	Typic Dystrochrepts, breakland drainageway heads	2,008
W	Water	1,199
	Total acres	1,286,459

Table 12. Alphabetical List of National Cooperative Soil Survey Map Unit Names

Map Unit Symbol	National Cooperative Soil Survey Map Unit Name
22AHR	Andeptic Cryoboralfs, low relief rolling uplands
46C65	Andic Cryochrepts and Dystric Cryochrepts, moderately steep moraines
24CH6	Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands
24CHQ	Andic Cryochrepts-Cryaquepts complex, high relief rolling uplands, weathered granitic substratum
22AH6	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands
22A6Q	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum
22AHQ	Andic Cryochrepts-Cryaquepts complex, low relief rolling uplands, weathered granitic substratum, warm
46C66	Andic Cryochrepts-Cryaquepts complex, moderately steep moraines
36C66	Andic Cryochrepts-Cryaquepts complex, moderately steep nivational hollows
32A66	Andic Cryochrepts-Cryaquepts complex, mountain slopes
36A66	Andic Cryochrepts-Cryaquepts complex, nivational hollows
31C65	Andic Cryochrepts, dissected mountain slopes
31CH5	Andic Cryochrepts, dissected mountain slopes, warm
24AH5	Andic Cryochrepts, high relief rolling uplands
31DH7	Andic Cryochrepts-Dystric Cryochrepts complex, dissected mountain slopes
42D67	Andic Cryochrepts-Dystric Cryochrepts complex, glacial cirques
32A65	Andic Cryochrepts, gently sloping mountain slopes
48C65	Andic Cryochrepts, glacial trough walls
24C65	Andic Cryochrepts, high relief rolling uplands
24CHX	Andic Cryochrepts, high relief rolling uplands, weathered granitic substratum
24CH5	Andic Cryochrepts, high relief rolling uplands, warm
22AH5	Andic Cryochrepts, low relief rolling uplands
22A6X	Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum
22AHX	Andic Cryochrepts, low relief rolling uplands, weathered granitic substratum, warm
33C65	Andic Cryochrepts, moderately steep mountain ridges
32CH5	Andic Cryochrepts, moderately steep mountain slopes
33A65	Andic Cryochrepts, mountain ridges
33A67	Andic Cryochrepts, mountain ridges, cold
46A66	Andic Cryochrepts-Cryaquepts complex, gently sloping moraines
24C33	Andic Dystrochrepts-Aquepts complex, high relief rolling uplands
22A33	Andic Dystrochrepts-Aquepts complex, low relief rolling uplands
31C41	Andic Dystrochrepts, dissected mountain slopes
24A3N	Andic Dystrochrepts, rolling uplands, weathered granitic substratum
22A31	Andic Dystrochrepts, low relief rolling uplands
31C38	Andic Dystrochrepts-Typic Dystrochrepts complex, dissected mountain slopes
24C38	Andic Dystrochrepts-Typic Dystrochrepts complex, high relief rolling uplands
47A66	Cryandepts-Cryumbrepts complex, glacial trough bottoms
10A99	Cryaquepts-Cryumbrepts complex, stream bottoms
10AD9	Cryumbrepts-Cryaquepts-Andic Cryochrepts complex, stream bottoms
41E67	Cryochrepts-Rock outcrop complex, glacial cirques
31D67	Dystric Cryochrepts, dissected mountain slopes
31DHP	Dystric Cryochrepts, dissected mountain slopes, basalt and andesite substrata
61EHP	Dystric Cryochrepts, dissected stream breaklands, andesite substratum
61EH7	Dystric Cryochrepts, dissected stream breaklands, warm
48DH7	Dystric Cryochrepts-Entic Cryandepts complex, steep glacial trough walls
60E67	Dystric Cryochrepts-Entic Cryandepts complex, undissected stream breaklands
42E67	Dystric Cryochrepts-Entic Cryumbrepts complex, glacial cirques
48D67	Dystric Cryochrepts-Entic Cryumbrepts complex, steep glacial trough walls
47A6P	Dystric Cryochrepts, glacial trough bottoms
48C6P	Dystric Cryochrepts, glacial trough walls
32CHP	Dystric Cryochrepts, moderately steep mountain slopes
33C6P	Dystric Cryochrepts, mountain ridges
61E67	Dystric Cryochrepts-Rock outcrop complex, dissected stream breaklands
48E67	Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls
48E6P	Dystric Cryochrepts-Rock outcrop complex, very steep glacial trough walls, andesite substratum
48DHP	Dystric Cryochrepts, steep glacial trough walls
46D67	Dystric Cryochrepts, steep moraines
61E8B	Dystric Cryochrepts-Typic Cryandepts complex, dissected stream breaklands
46D6P	Dystric Cryochrepts-Typic Cryandepts complex, steep moraines
46AH5	Entic Cryandepts, gently sloping moraines

Table 12. Alphabetical List of National Cooperative Soil Survey Map Unit Names--Continued

Map Unit Symbol	National Cooperative Soil Survey Map Unit Name
32AH5	Entic Cryandepts, gently sloping mountain slopes
32C65	Entic Cryandepts, moderately steep mountain slopes
31C8B	Entic Cryandepts-Typic Cryandepts complex, dissected mountain slopes
32A8B	Entic Cryandepts-Typic Cryandepts complex, gently sloping mountain slopes
24C8B	Entic Cryandepts-Typic Cryandepts complex, high relief rolling uplands
22A8B	Entic Cryandepts-Typic Cryandepts complex, low relief rolling uplands
32C8B	Entic Cryandepts-Typic Cryandepts complex, mountain slopes
31D8B	Entic Cryandepts-Typic Cryandepts complex, steep dissected mountain slopes
31D77	Entic Cryumbrepts-Rock outcrop complex, dissected mountain slopes
48E77	Entic Cryumbrepts-Rock outcrop complex, very steep glacial trough walls
10AUU	Entisols, sandy substrata; Riverwash; and Dumps, mine
31C3C	Eutric Glossoboralfs, dissected mountain slopes
31C3R	Eutric Glossoboralfs, dissected mountain slopes, basalt substratum
46AHC	Eutric Glossoboralfs, gently sloping moraines
24C3C	Eutric Glossoboralfs, high relief rolling uplands
22A3C	Eutric Glossoboralfs, low relief rolling uplands
22A4R	Eutric Glossoboralfs, low relief rolling uplands, basalt substratum
50EUU	Inceptisols and Mollisols, very steep landslide deposits
50CUU	Inceptisols, Mollisols, and Alfisols, moderately steep landslide deposits
63E1J	Lithic Ultic Argixerolls-Rock outcrop complex, breakland drainage heads
61E1J	Lithic Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands
27A2J	Lithic Ultic Argixerolls-Ultic Argixerolls complex, plateaus
61E22	Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands
61E12	Lithic Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry
32AHP	Mollic Cryoboralfs, gently sloping mountain slopes
13AUU	Mollisols, Inceptisols, and Alfisols; terraces and alluvial fans
61ENZ	Rock outcrop
61E2J	Rock outcrop-Ultic Argixerolls complex, dissected stream breaklands
33CA7	Typic Cryandepts, moderately steep mountain ridges, dry
33C77	Typic Cryandepts-Rock outcrop complex, moderately steep mountain ridges
31D38	Typic Dystrochrepts-Andic Dystrochrepts complex, dissected mountain slopes
63E38	Typic Dystrochrepts, breakland drainage heads
61E38	Typic Dystrochrepts, dissected stream breaklands
61E32	Typic Dystrochrepts-Rock outcrop complex, dissected stream breaklands
31D48	Typic Dystrochrepts-Typic Vitrandepts complex, dissected mountain slopes
61E48	Typic Dystrochrepts-Typic Vitrandepts complex, dissected stream breaklands
60E48	Typic Dystrochrepts-Typic Vitrandepts complex, undissected stream breaklands
24C41	Typic Vitrandepts, high relief rolling uplands
22A41	Typic Vitrandepts, low relief rolling uplands
31C2E	Ultic Argixerolls, dissected mountain slopes
31C1E	Ultic Argixerolls, dissected mountain slopes, dry
31C3F	Ultic Argixerolls, dissected mountain slopes, moist
61E3F	Ultic Argixerolls, dissected stream breaklands, moist
61E2E	Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands
61E1E	Ultic Argixerolls-Rock outcrop complex, dissected stream breaklands, dry
27A3F	Ultic Argixerolls, plateaus
31D3F	Ultic Argixerolls, steep dissected mountain slopes
31D1E	Ultic Argixerolls, steep dissected mountain slopes, dry
60E3F	Ultic Argixerolls, undissected stream breaklands
60E1E	Ultic Argixerolls, undissected stream breaklands, dry
31C24	Ultic Haploxerolls, dissected mountain slopes
31D14	Ultic Haploxerolls, dissected mountain slopes, dry
61E24	Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands
61E14	Ultic Haploxerolls-Rock outcrop complex, dissected stream breaklands, dry
31D24	Ultic Haploxerolls, steep dissected mountain slopes

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