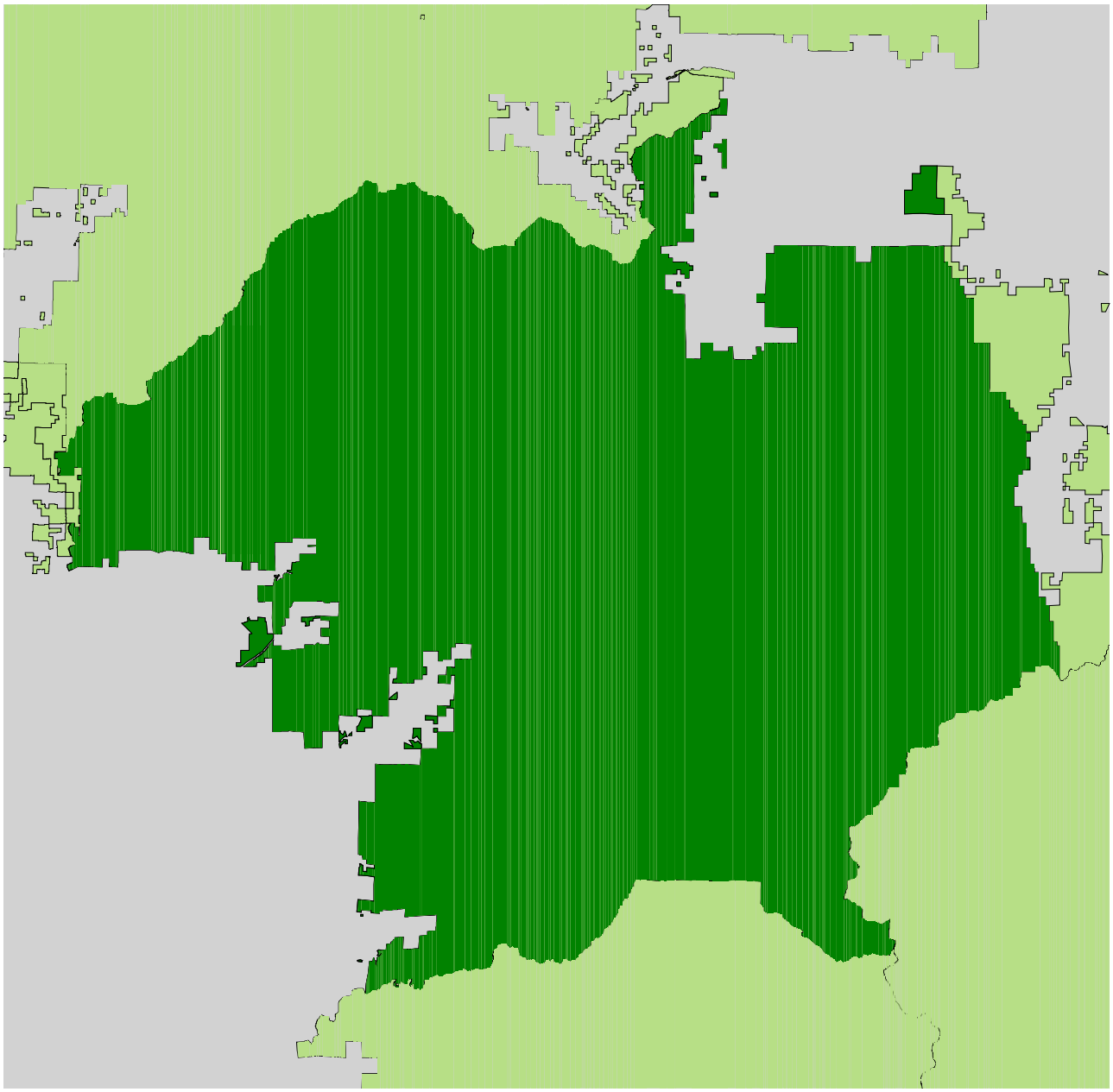
Soil Survey
Tahoe
National Forest Area
California

PDF Version 2.0

January 2002



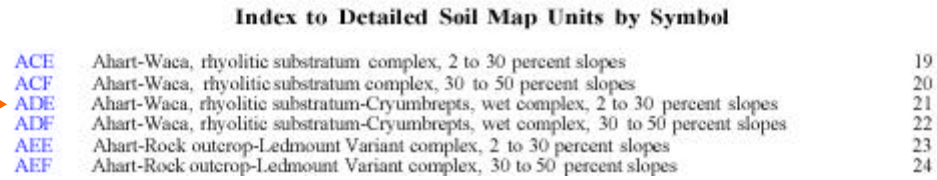
ABOUT THE SOIL SURVEY

Hi! Thanks for taking time to try out this new format of the Tahoe National Forest Soil Survey. This document was primarily designed to be a more convenient format of storage and reproduction of the original soil survey. The electronic (PDF) document retains most of the original format of the original published document with a few added surprises:

HYPERLINKS

All the text that is colored blue indicates that it is linked to another page or area in the document.

Click on blue text...



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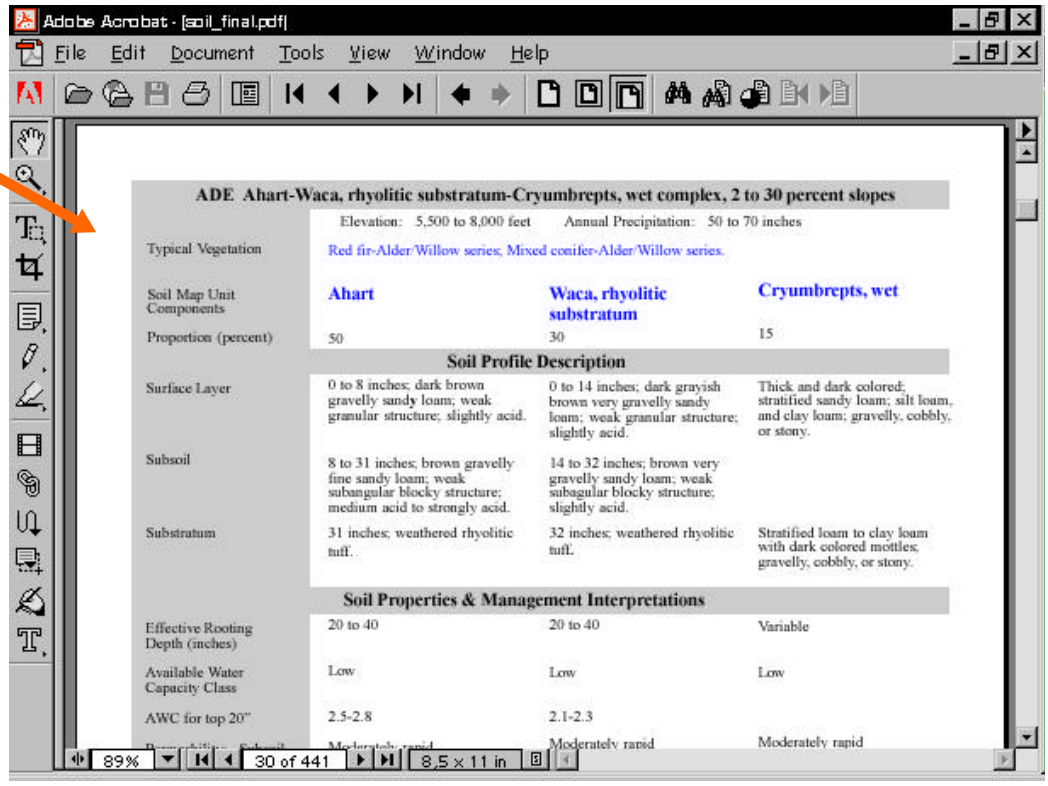

Adobe Acrobat - [soil_final.pdf]

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ADE Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.		
Soil Map Unit Components	Ahart	Waca, rhyolitic substratum	Cryumbrepts, wet
Proportion (percent)	50	30	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam; silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.	14 to 32 inches; brown very gravelly sandy loam; weak subagular blocky structure; slightly acid.	
Substratum	31 inches; weathered rhyolitic tuff.	32 inches; weathered rhyolitic tuff.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	Variable
Available Water Capacity Class	Low	Low	Low
AWC for top 20"	2.5-2.8	2.1-2.3	
		Moderately rapid	Moderately rapid

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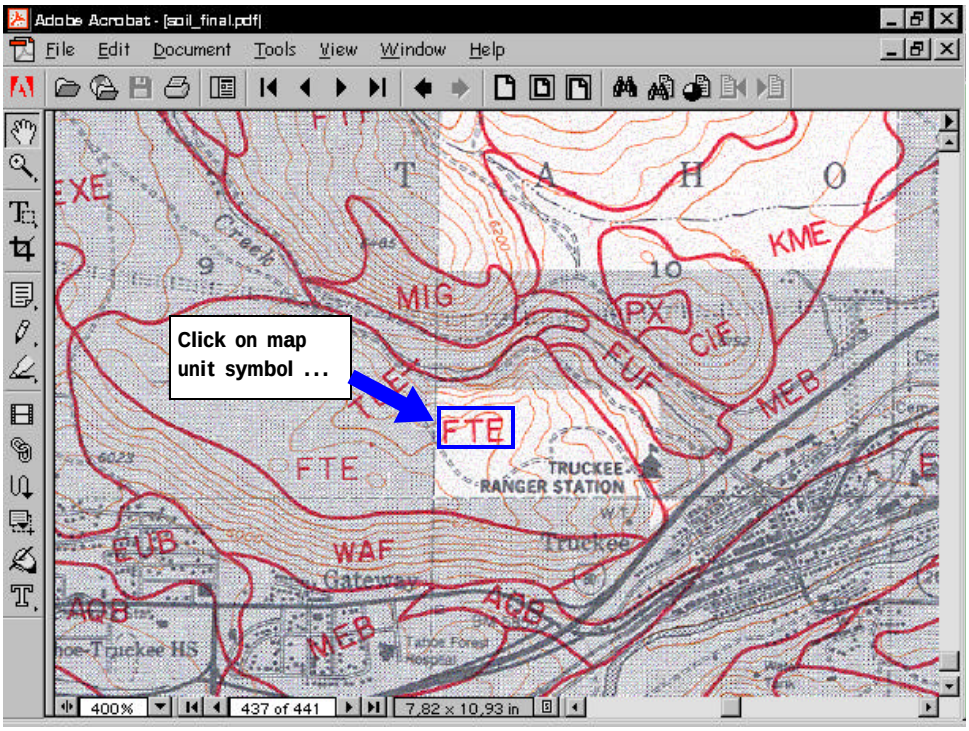
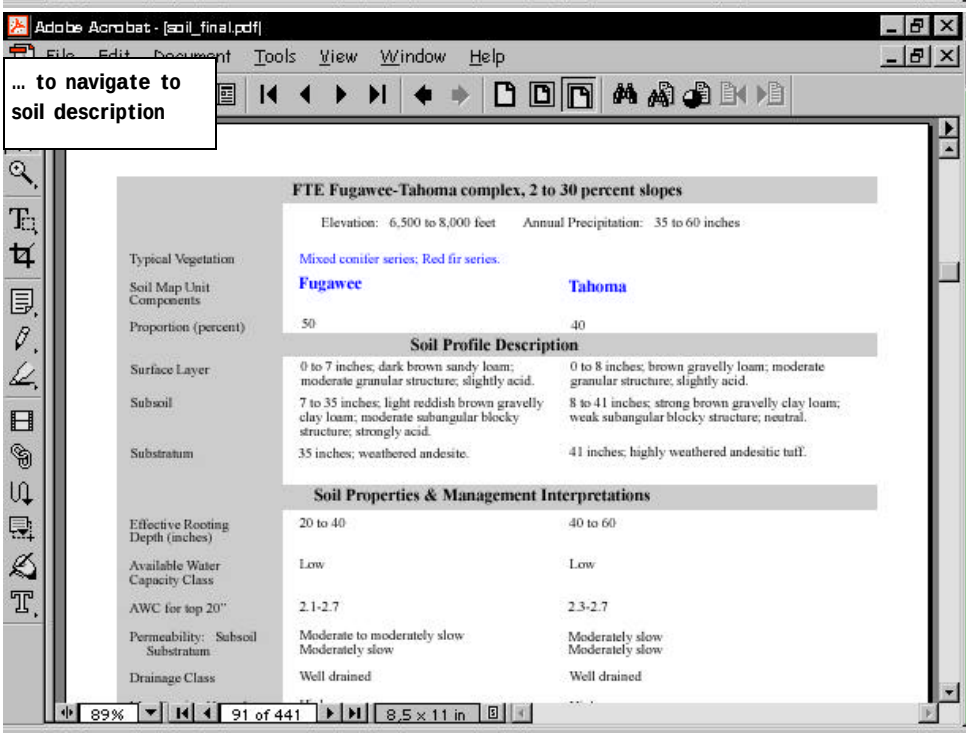
Many of the graphics in the document are hyperlinked also, such as the general soils map and the polygons contained in the soil map quads:





Anyway, play with it, print out some pages and just have fun! Your feedback and/or suggestions would be appreciated. If you are interested in having your forest's soil survey or any other document in this format, I can be contacted with the following information below:

Tiffany Norman
Tahoe National Forest
631 Coyote Street
Nevada City, CA 95959
tpnorman@fs.fed.us

I hope this document will serve some use!

da tiFFstEr! ✪

Tahoe National Forest Area, California

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, and state agencies including The Regents of the University of California (Agricultural Experiment Station). 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 Soil Conservation Service in consultation with the Forest Service. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Departement of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major field work for this soil survey was performed in the period 1973 to 1979. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Forest Service and the Soil Conservation Service. The survey area consists of the Tahoe National Forest and a portion of the Tolyabe National Forest. It is bordered by the Plumas National Forest and Sierra Valley in the north. The California-Nevada state line is the eastern boundary. The southern boundary is the Lake Tahoe basin watershed boundary and the Eldorado National Forest. The western boundary is the Tahoe National Forest boundary.

Soil maps in this survey may be copied without permission.

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Foreword

The Soil Survey of the Tahoe National Forest Area, California was designed to furnish soils information for Forest-wide resource management planning as specified in the "Forest and Rangeland Renewable Resources Planning Act of 1974" and the "National Forest Management Act of 1976. " It was designed to obtain soils information to facilitate Forest Land and Resource Management Planning and to provide soils information at the position statement phase of project plans.

The Soil Survey is also useful as a training guide to acquaint land managers, technicians, and other personnel with the soils of the Tahoe National Forest area.

Great differences in soil properties can occur even within short distances. Soil may be shallow to bedrock and incapable of producing commercial timber. Soils may be seasonally wet or subject to flooding. A soil property may make a soil poorly suited to reforestation.

Thes and many other properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each soil map unit is shown on detailed soil maps. Each kind of soil in the survey area is described, and information is given about each soil for specific uses.

This soil survey can be useful in the conservation, improvement, and productive use of soil, water, and other resources.

GERI B. LARSON
Forest Supervisor
Tahoe National Forest

Soil Survey of Tahoe National Forest Area, California

By Richard O. Hanes, Forest Service

Soils surveyed by Fred O. Sutter, Jr., Charles R. Mitchell, John Florin, Charles B. Goudey, Bruce Stoneman, Forest Service

How This Survey was Made

This Order 3 soil survey has followed the directives and guidelines in the Forest Service Manual and Handbooks. It has also followed the concepts, procedures, and guidelines of the National Cooperative Soil Survey as specified in the *Soil Survey Manual (9),* the *National Soils Handbook (7),* and the classification system as stated in *Soil Taxonomy* (10).

Soil Scientists begin the inventory by collecting, studying, and correlating all the existing data and information concerning the survey area that is related to soil genesis and morphology. This includes lithological, geomorphological, topographical and elevational, climatic, vegetative, and existing soil survey data both within and adjoining the survey area.

This data and information was assimilated and transferred to a single base map of suitable scale and accuracy forming the beginning soil map unit delineations or a schematic map. With the schematic map and aerial photo field sheets (stereo-pair coverage) in hand, the soil scientist made a reconnaissance study of the survey area. At this time, the delineations on the schematic map are checked for accuracy of content and location. The aerial photos were studied stereoscopically and the photo images were compared to the conditions found on the ground to insure that later recognition by photo interpretation would be credible. Lithologic, geomorphic, soil, and vegetative characteristics were recognized and recorded in field notes, on the schematic map, and on the aerial photo field sheets.

Using the augmented and corrected schematic map, field notes, and an understanding of how the photo images relate to actual conditions on the ground, the soil scientist delineated map units on the aerial photographs. The map units corresponded to segments of the landscape having similar landform, vegetative cover, and soils as determined by a knowledge of ground conditions and by stereoscopic aerial photo interpretation. These aerial photos with the delineated map units and delineation symbols became the exploratory or preliminary soils map.

With the aerial photo (exploratory soils maps) and a field stereoscope, the soil scientist examined on the ground as many delineations of each map unit as was possible, considering the access and time allowed to complete the survey. In this way, each different map unit was examined, studied, and described by aerial photo interpretations and on-the-ground investigation. However, because of the design of the survey, Order 3 in intensity, and the time allotted for its completion, every delineation of each different map unit was not visited and examined on the ground. Those delineations with no easy access were rarely visited other than by aerial photo interpretation. In this way, possibly one-third of the delineations on the field sheets and maps would not have been entered and examined by an on-the-ground investigation. *This is one of the main aspects of this survey that limits its reliability. It is one reason that* the survey is unsuited for project planning without field verification. As each map unit was visited and examined, individual soils ere recognized, studied, described, classified, and enough data was collected to furnish the information needed to make interpretations and predictions concerning the use and management of each soil. *However, the exact location of each soil was not delineated.* The map units usually consist of a group of soils that occupy a partici lar portion of the landscape shich has been delineated on the aerial photo field sheets. Depending on the area location and extent of the individual soils that are components of the delineated map unit, a map unit is called an association or complex of soil components. The soil scientist makes a field and aerial photo examination to estimate the soil component percentage composition for each map unit. These map units *do not* necessarily consist of similar soils. They consist of geographically associated soils that may be, and usually are, quite different in their characteristics and their suitability for use and management. *These are other aspects of the survey that*

limit its reliability and make it unsuitable for project planning without field verification.

This field examination and study, and the associated correction and refinement of the aerial photo field sheets, produces the Order 3 intensity soil maps called for in this system of survey.

The interpretations and predictions concerning use and management found in this report are based on the soil scientist's knowledge and understanding of the conditions recognized and measured in the time allotted to this inventory. By classifying the soils, the soil scientist can also, with acceptable reliability, bring information concering use and management of a particular soil from other survey areas where this same soil occurs and has been recognized and studied. Because of the time allocation for the completion of this survey, these use and management interpretations and predictions should he considered as first or second approximations due to the relatively few examinations and measurements that have been made. *This is still another aspect of the survey that limits its reliability and makes it unsuitable for project planning without field verification.*

Despite the cautions that have been made in the above paragraphs concerning the use of this survey information for project level planning, it is adequate and reliable for its intended and designed purpose: a base for a Forest-wide system of land management planning.

General Nature of the Survey Area

This section describes the physiography, relief, and drainage of the survey area and its geology and geomorphic history. It also gives information on the climate and vegetation of the survey area.

Physiography, Relief, and Drainage

The Tahoe National Forest Area is located in the central Sierra Nevada. It is roughly divided into three physiographic areas by a glacially sculptured crest zone that trends north-south. The western third of the survey area is dominated by deeply incised canyons separated by long, narrow, genitly sloping ridges. The eastern third is characterized by low foothills and broad valleys.

The ascent from the Central Valley through the western third of the Area toward the crest is gentle, with the average slope through a west-to-east transect about 3 to 5 percent. The underlying rock formations generally trend northwest by southeast. Drainages are generally toward the southwest, with main stream channels cut through and across geologic formations. The headwaters of major drainages start in the glaciated crest zone, and descend though gently sloping volcanic and granitic bedrock to deeply entrenched V-shaped canyons along the western edge of the area, where metamorphic rocks are exposed. Typically, the land surfaces of the folded and faulted metamorphic rocks are steep and angular, the land surfaces of granitic rocks rounded, smooth, and often have a basin-like appearance, and the land surfaces of volcanic rocks are flat and relatively smooth, reflecting their origin.

The western portion of the Survey Area contains the headwaters of the South, Middle, and North Forks of the Yuba River and its tributaries, and the headwaters of the North and Middle Forks of the American River. The eastern portion contains the headwaters of the Little Truckee River, and the headwaters of the Truckee River from near Lake Tahoe to the State line. The northeastern portion of the Area is drained by the Feather River.

Geology and Geomorphic History

The Tahoe National Forest Area is in the Sierra Nevada geomorphic province and lies on the western slope of the Sierra Nevada range. Early in geologic time, in the late Paleozoic period, the area was covered by a vast inland sea in which large amounts of several kinds of sediment were deposited. The sediment of this sea was uplifted, and intensly folded and metamorphosed. This resulted in a nearly continuous belt of undifferentiated metamorphic rocks, tilted almost vertically, forming ridges extending generally to the northwest. The metamorphism changed the fine grained sedimentary rocks to slate, the siliceous sediments to quartzites and metacherts, the volcanic rock to amphibolitic schists and greenstone, and the calcareous ooze to crystalline limestone.

The folding and uplifting was followed by intrusions of ultrabasic rock, most of which was altered to peridotite and serpentine. This was followed by a sequence of major intrusions of granitic-type rocks, beginning with the more basic gabbrodiorite and followed by the more acid granodiorite. At this time the slopes in the survey area were aligned more gently westward than they are today, with the crest of the Sierra Nevada approximately in its present location. The surface of the folded sedimentary and igneous rocks was then eroded away during a long period of erosion, exposing the underlying granitic batholith.

Volcanic activity began in the Sierra Nevada in the late Eocene period. Rhyolitic ash was deposited over large areas, both as flows and ash falls. These ash falls and flows formed the Valley Springs formation. This formation choked stream channels, completely changing the drainage system. Following the rhyolithic emissions,

the volcanoes began to discharge andesitic material, mostly mud flows, dust, and lava flows. These flows formed the Mehrten formation, a volcanic plain. This formation also choked stream channels and caused a new drainage pattern to form. The geologic activity of this period marked the beginning of the present landforms, and had a strong influence in forming the soil patterns in the Area.

In Pleistocene times, a major uplift of the Sierra Nevada Range was controlled by faulting along the Range's east flank. The western slope was uniformly tilted downwards in relation to the crest. This caused the west-flowing rivers and streams in the newly uplifted area to remove much of the volcanic debris and to cut deep canyons into the underlying materials. This downcutting left long, tabular, volcanic ridges between the canyons, with exposures of Tertiary river gravel, rhyolitic tuff, granitic rock, and metamorphic rock. Glaciers were active from the crest down to about 4,800 feet. Glaciation sculptured the present day crest zone, exposing large areas of glaciated granitic rock. Glacial till and outwash material was deposited in basins and along drainages at the margin of the crest glaciation.

Climate

The Tahoe National Forest Area has abundant sunshine in summer, low to heavy precipitation in winter, and wide temperature ranges. Precipitation ranges from about 15 inches in the northeast corner of the area near Balls Canyon to over 80 inches in the mountains and western part of the area. At high elevations, much of the precipitation falls as snow, providing a water supply that lasts into summer. Precipitation in summer is light and generally limited to a few scattered thundershowers in the western part of the area, which increase in frequency and intensity from west to east.

Temperatures range from very warm in the canyons in the western part during summer to very cold in the high areas and eastern parts in the winter. All of the area experiences freezing temperatures at some time during the year.

The Sierra Nevada and the Verdi and Bald Mountain ranges in the eastern part of the area, play a dominate role in determining the climate. Differences in elevation affect both temperatures and precipitation. On the western slopes of the Sierra Nevada, precipitation increases with elevation up to about 6,000 feet, and decreases slowly above that level. Temperatures also decrease with elevation, except in some of the canyons where cold air drainage has made them cooler than the slopes above. The same process is also taking place on the western slopes of the Verdi and Bald Mountain ranges, leading to desert-like conditions on their eastern flank.

The average annual temperature in the Tahoe National Forest Area ranges from 38F at the higher elevations and on the eastside to 62F at the lower elevations in the west.

In general, prevailing winds are from the south or southwest. Wind speeds average less than 10 miles per hour. Winter wind speeds occasionally reach 50 miles per hour. Snow cover on the higher elevations reduces the depth of soil freezing. The coarse textures are not highly susceptible to frost heaving. Frost heaving is most prevalent along the transition elevations between snow and rain. Except for granulation of the surface horizon, soil structure is not greatly influenced by frost action.

Cool temperatures at the higher elevations favor the accumulation of organic matter and the formation of thick, dark colored soil surface horizons in areas where tree and shrub cover is most abundant.

Chemical weathering of the soil is dominant over physical weathering in the lower elevations, giving way to physical weathering at higher elevations because of cooler temperatures. A lack of soil moisture in summer when temperature conditions are more favorable for chemical action, also retards the weathering processes.

Vegetation

Vegetation was mapped concurrently with the soil survey mapping. Various stages of plant succession are reflected in some of the vegetative series. For ease of recognition, commonly know plant names are used in the name of the series and in the series description. The percentages used in the description indicate the relative populations of typifying plants and do not reflect total plant composition or density measurements.

Alder series. Typically 90 percent dense alders with sedges and some willows.

Barren. Typically 90 percent devoid of vegetation. Most areas occur on exposed rockland with no soil. Some areas have inclusions of soil and have scattered mixed brush, grass, conifers, or hardwoods.

Barren-Conifer/Meadows series. Typically 50 percent barren, 30 percent mixed conifers, and 20 percent meadow (or Alder/Willows with patches of huckleberry oak). Conifers are red fir, Jeffrey pine, or lodgepole pine.

Barren-Live oak series. Typically 60 percent barren and 40 percent live oak. The oak is mostly canyon live

oak with some interior live oak. Included are small areas of scattered conifers, black oak, grass, or mixed brush. Digger pine may be included in canyons below an elevation of 3,000 feet.

Barren-Mixed brush series. Typically 60 percent barren and 40 percent mixed brush with scattered mixed conifers. Brush consists of mainly huckleberry oak, with chinquapin oak, mountain whitethorn, greenleaf manzanita, or bittercherry.

Barren-Mixed conifer series. Typically 60 to 70 percent barren and 20 to 30 percent mixed conifers with some mixed brush. Induded may be 20 percent hardwoods and manzanita. At higher elevations the conifers are Jeffrey pine, red fir, western white pine, lodgepole pine, or, in some areas, juniper. All are commonly stunted or deformed. At lower elevations the conifers are ponderosa pine, Douglas fir, incense cedar, or white fir. The manzanitas are greenleaf manzanita or whiteleaf manzanita. The hardwoods are black oak or canyon live oak, with some interior live oak.

Barren-Manzanita series. Typically 60 percent barren, 30 percent manzanita, and 0 to 10 percent mixed conifers. The manzanita is greenleaf manzanita or whiteleaf manzanita. The mixed conifers are ponderosa pine, Douglas fir, or white fir. This series represents a successional stage created by past disturbance.

Barren-Red fir series. Typically 70 percent barren and 30 percent red fir with some wyethia and mixed brush.

Barren-Red fir/Hemlock series. Typically 60 percent barren, a 30 percent mixture of red fir, mountain hemlock, and lodgepole pine, and 10 percent Alder/Willow and meadows.

snowbrush and 20 percent alder, willow, or meadow. It includes small areas of mountain whitethorn, bittercherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

Ceanothus-Jeffrey/Ponderosa series. Typically 70 percent snowbrush and 30 percent Jeifrey/Ponderosa series. It includes small areas of greenleaf manzanita, sagebrush, bittercherry, wyethia, or a few lodgepole pine. This series represents a successional stage created by past management.

Ceanothus-Mixed conifer series. Typically 70 percent snowbrush and 30 percent mixed conifers. It includes small areas of mountain whitethorn, bittercherry, greenleaf manzanita, wyethia, sagebrush, or bitterbrush. Conifers consist of Jeffrey pine, Ponderosa pine, white fir, or red fir. This series represents a successional stage created by past disturbance.

Ceanothus-Red fir series. Typically 70 percent snowbrush and 30 percent red fir. Included are small areas of mountain whitethorn, bittercherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

California bay-Mixed brush series. Typically 50 percent California bay (shrub form) and 50 percent mixed brush. Included are small areas of incense cedar, Jeffrey pine, Douglas fir, knobcone pine, or leather oak. The mixed brush is whiteleaf manzanita, buckbrush, and Yerba Santa. This series occurs on serpentinitic soils and represents a successional stage created by past disturbance.

Grass series. Mostly perennial grasses, with sedges, white alder, and willows. A few hardwoods and conifers may be included.

Hardwoods-Mixed conifer series. Typically 60 percent Hardwoods and 40 percent mixed conifer. The hardwoods consist of 50 percent canyon live oak and 50 percent black oak, with inclusions of interior live oak. The conifers are ponderosa pine, Douglas fir, and white fir.

Jeffrey/Ponderosa series. Typically a mixture of Jeffrey pine and ponderosa pine with up to 10 percent inclusions of lodgepole pine or white fir and bitterbrush or wyethia.

Jeffrey/Ponderosa-Mahogany series. Typically 60 percent Jeffrey/Ponderosa series, 20 percent mahogany, and 20 percent sagebrush with some bitter brush and wyethia.

Jeffrey/Ponderosa-Sagebrush/Bitterbrush series. Typically 60 percent Jeffrey/Ponderosa series and 40 percent Sagebrush/Bitterbrush series, with some wyethia and rabbitbrush, and a few white fir and lodgepole pine.

Live oak series. Typically more than 80 percent live oak on canyonsides. The oak is mostly canyon live oak, with some interior 1ive oak. Some areas may have up to 20 percent black oak, conifers, grasses, mixed brush, or barren.

Lodgepole-Alder/Meadow series. Typically 80 percent lodgepole pine and 20 percent alder and meadows. Small amounts of red fir or white fir may be included. Meadows are mostly sedges with some rushes and hairgrass; perennial grasses are on the drier fringes with some stringers of aspen and cottonwood included.

Lodgepole-Meadow/Willow series. Typically 75 percent lodgepole pine and 25 percent meadow and willow, with small amounts of Jeffrey pine or white fir. Meadow consists of sedges, some rushes and hairgrass, with perennial grasses on the drier fringes.

Manzanita-Jeffrey pine series. Typically 60 percent whiteleaf manzanita, 20 percent Jeffrey pine, and 20 percent mixed brush. Mixed brush is Yerba Santa, buckbrush, and leather oak. Included are small amounts of incense cedar, Douglas fir, and digger pine.

Manzanita-Open conifer series. Typically 30 percent manzanita, 50 percent barren, and 20 percent mixed conifers. Manzanita is greenleaf and whiteleaf manzanita. The conifers are Douglas fir, ponderosa pine, and white fir with some knobcone pine.

Meadow series. Typically sedges with some rushes and hairgrass. Perennial grasses or sagebrush are on the drier fringes. Small areas of willows, lodgepole pine, or aspen may be included. Meadows are open and normally more than 10 acres in size.

Meadow/Willow series. Typically sedges with some rushes and hairgrass. Perennial grasses or sagebrush occur on drier fringes of the meadow. Included are stringers or patches of willow, alder, lodgepole pine, aspen, or cottonwood.

Mixed brush-Alder/Willow series. Typically 60 percent mixed brush, 20 percent alder or willow stringers with openings or fringes of sedges, and 20 percent wyethia. The mixed brush is huckleberry oak, with some greenleaf manzanita and mountain whitethorn.

Mixed brush-Barren series. Typically 70 percent mixed brush and 30 percent barren with scattered mixed conifers. The brush consists of huckleberry oak, with chinquapin oak, mountain whitethorn, greenleaf manzanita, and bittercherry.

Mixed brush-Conifer/Meadow series. Typically 40 percent mixed brush, 20 percent mixed conifers, 20 percent meadows with alders or willows, and 20 percent barren. The brush is nuckleberry oak with some greenleaf manzanita and mountain whitethorn. Conifers are Jeffrey pine, red fir, western white pine, or lodgepole pine.

Mixed brush-Mixed conifer series. Typically 60 to 70 percent mixed brush and 30 to 40 percent mixed conifers. The brush is huckleberry oak, mountain whitethorn, chinquapin oak, or greenleaf manzanita. The conifers are Jeffrey pine, ponderosa pine, Douglas fir, red fir, white fir, or western white pine.

Mixed conifer series. At lower elevations, a mixture or ponderosa pine, Douglas fir, incense cedar, white fir, or sugar pine, with inclusions of black oak. At higher elevations, a mixture of white fir, Jeffrey pine, and red fir, with inclusions of western white pine or sugar pine. Lodgepole pine are along drainages. The understory may include mountain whitethorn and wyethia.

Mixed conifer-Alder/Willow series. Typically 80 percent mixed conifers and 20 percent alders or willows- with inclusions of sedges in openings, aspen, cottonwood, or lodgepole pine.

Mixed conifer-Barren series. Typically 50 to 60 percent mixed conifer, 30 percent barren, and 10 to 20 percent wyethia, huckleberry oak, greenleaf manzanita, sagebrush, or bitterbrush.

Mixed conifer-Ceanothus series. Typically 60 percent higher elevation mixed conifer and 40 percent snowbrush, with some mountain whitethorn, bitteocherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

Mixed conifer-Mixed brush series. Typically 60 percent mixed conifer and 40 percent mixed brush. The brush is huckleberry oak, mountain whitethorn, chinquapin oak, greenleaf manzanita, or pinemat manzanita.

Mixed conifer-Sagebrush series. Typically 60 -percent higher elevation mixed conifer and 40 percent sagebrush, with some lodgepole pine, bitterbrush, and wyethia.

Mixed conifer-Wyethia series. Typically 60 percent higher elevation mixed conifer and 40 percent Wyethia series.

Mixed conifer-Black oak series. Typically 70 percent lower elevation mixed conifer and 30 percent black oak.

Mixed conifer-California bay series. Typically 80 percent lower elevation mixed conifer and 20 percent California bay with canyon live oak.

Mixed conifer-Dogwood/Maple series. Typically 60 percent lower elevation mixed conifer and 40 percent dogwood and maple, with white alder and yew along stinger seeps or areas of high water table.

Mixed conifer-Dwarf Tanbark series. Typically 50 percent lower elevation mixed conifer and 50 percent dwarf tanbark with inclusions of huckleberry oak, greenleaf or whiteleaf manzanita, bear grass, or canyon live oak or black oak.

Mixed conifer-Mixed hardwood series. Typically 60 percent lower elevation mixed conifer and 40 percent mixed hardwoods. The hardwoods consist of madrone with tan oak and black oak.

Plantation. Typically plantations of ponderosa pine, at or near crown closure.

Red fir series. Typically 90 percent red fir. Included are small amounts of western white pine, lodgepole pine, white fir, and hemlock near high ridges. There are small amounts of mountain whitethorn or pinemat manzanita in the understory.

Red fir-Alder/Willow series. Typically 80 percent red fir and 20 percent alder or willow stringers. Included are sedges in openings and small amounts of lodgepole pine, aspen, wyethia, and meadows.

Red fir-Barren series. Typically 60 percent Red fir series and 40 percent barren.

Red fir-Wyethia series. Typically 60 percent Red fir series and 40 percent Wyethia series, with some mountain whitethorn and huckleberry oak.

Red fir/Hemlock-Alder/Willow series. Typically 40 percent red fir, 40 percent mountain hemlock, and 20 percent alders, willows, or meadows with some lodgepole pine.

Sagebrush/Bitterbrush series. Typically sagebrush with bitterbrush and small amounts of wyethia and rabbitbrush. The common perennial grass is squirreltail.

Sagebrush/Bitterbrush-Jeffrey/Ponderosa series. Typically 60 percent Sagebrush/Bitterbrush series and 40 percent Jeffrey/Ponderosa series.

Sagebrush/Bitterbrush-Meadow/Willow series. Typically 70 percent Sagebrush/Bitterbrush series and 30 percent Meadow/Willow series.

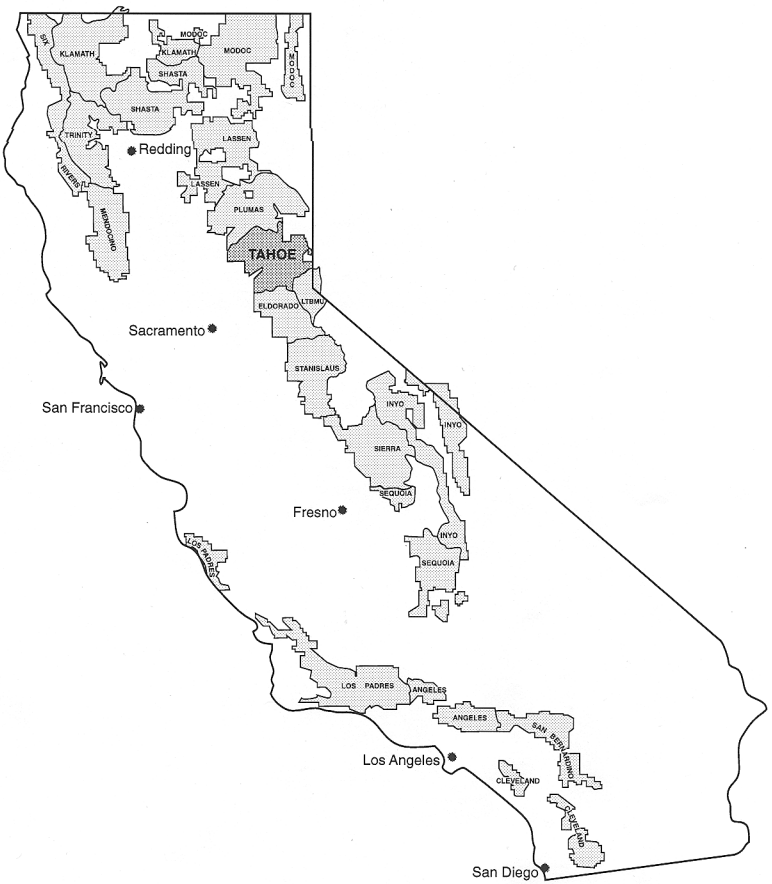
Sagebrush/Bitterbrush-Mixed conifer series. Typically 60 percent Sagebrush/Bitterbrush series and 40 percent mixed conifers, consisting of white fir, Jeffrey pine, and ponderosa pine.

Sagebrush-Mahogany series. Typically 70 percent sagebrush, 20 percent mountain mahogany, and 10 percent Jeffrey pine, with some wyethia.

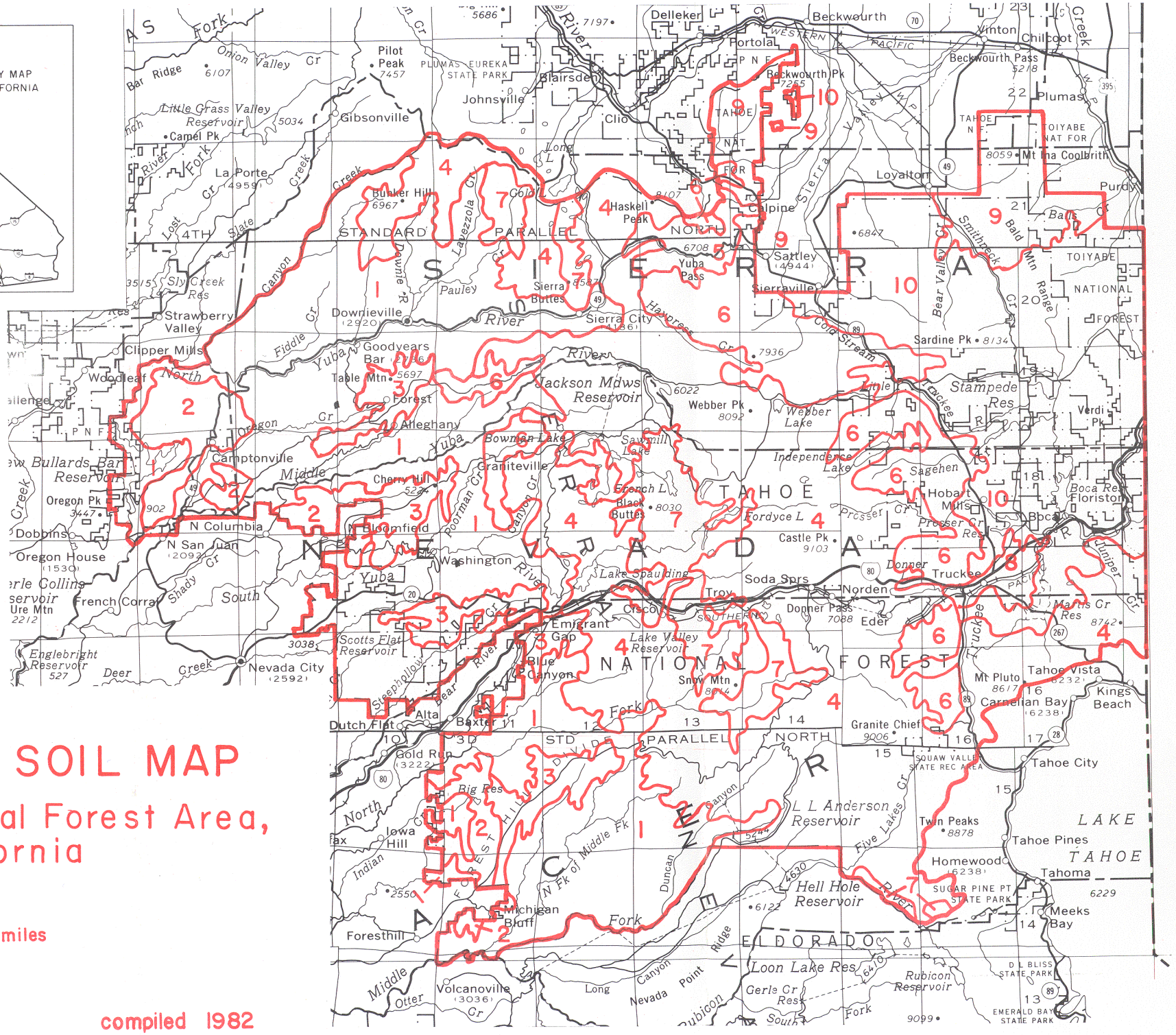
Wyethia series. Wyethia with 10 to 40 percent barren areas and small amounts of sagebrush and bitterbrush. The common grass is squirreltail.

Wyethia-Alder/Willow series. Typically 60 percent Wyethia series, 20 percent stringers of alder and willow with sedges in openings, and 20 percent red fir, mixed conifers, or lodgepole pine.

Wyethia-Red fir series. Typically 60 percent Wyethia series and 40 percent Red fir series.



Location of Tahoe National Forest, California



GENERAL SOIL MAP

Tahoe National Forest Area, California

0 2 4 6 12 miles

compiled 1982

General Soil Map Units

The general soil map shows map units which consist of many individual soils. A map unit typically is made up of one or more soils of major extent and several soils of minor extent. Map units are named for the major soils occurring in the unit. The soils in one unit can occur in other units. The soils are classified at the series level or at a higher taxonomic level.

The map furnishes a broad perspective of the soils in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. General areas which are capable of timber production or range production can be identified on the map. Likewise, general areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of the generalization of map units and the small scale of the map, the location of specific soils are not shown. The map and map unit information is not suitable for Forest or project level land management planning. They give a very general overview of soil conditions and are suitable for State or Regional planning.

The 10 general soil map units have been separated into 3 groups based on physiography:

1. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF THE WESTSIDE.

The soils in this group are well drained and somewhat excessively drained. They formed in material weathered from volcanic, metasedimentary, granitic, or ultra basic rock, as well as in glacial or alluvial deposits. Rock outcrops are numerous in many areas. Slopes are 2 to 75 percent.

These soils are on the lower slopes of the western Sierra Nevada, at elevations of 1,800 to 0,000 feet. The annual precipitation is 40 to 80 inches, and the frost-free growing season is 130 to 200 days.

Three map units are in this group. They make up about 33 percent of the survey area.

1 - Hurlbut-Deadwood-Putt

Moderately deep and shallow, nearly level to very steep, well drained and somewhat excessively drained soils on mountainsides.

This map unit is on the sides of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from metasedimentary rocks of the Calaveras Formation and glacial deposits. Elevations range from 2,000 to 0,000 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Hurlbut, Deadwood, and Putt soils. Other soils are of minor extent.

Hurlbut soils are moderately deep and well drained. Slopes range from 2 to 75 percent, Typically the surface layer is gravelly loam. The subsoil is silt loam over weathered metasedimentary rock.

Deadwood soils are shallow and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is very gravelly sandy loam. The subsoil is extremely gravelly sandy loam over metasedimentary rock.

Putt soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is very cobbly sandy loam. The underlying material is very cobbly sandy loam over cemented glacial deposits.

Areas of this unit are used mainly for timber production. The flatter areas are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

The timber producing soils in this unit have moderate available water capacity and moderate timber productivity.

2 - Cohasset-Jocal-Holland

Very deep and deep, nearly level to very steep, well drained soils on broad, fiat ridgetops and mountainsides.

This map unit is on the tops and upper slopes of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from andesitic conglomerate of the Mehrten Formation, metasedimentary rocks of the Calaveras Formation, and granitic rocks. Elevations range from 1,800 feet to 5,800 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Cohasset, Jocal, and Holland soils. Other soils are of minor extent.

Cohasset soils are deep and very deep, and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered andesitic conglomerate.

Jocal soils are deep and very deep, and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is silty clay loam over weathered slate and shale.

Holland soils are deep and very deep, and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered granitic rock.

Areas of this unit are used mainly for timber production. The flatter ridgetops are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

All soils in this map unit have high available water capacity and have high timber productivity.

3 - McCarthy-Crozier-Ledmount

Moderately deep and shallow, nearly level to very steep, well drained soils on ridgetops and mountainsides.

This map unit is on the top and upper slopes of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from andesitic tuff breccia mudflows of the Mehrten Formation. Elevations range from 2,000 to 6,000 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the McCarthy, Crozier, and Ledmount soils. Other soils are of minor extent.

McCarthy soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is very gravelly sandy loam over weathered andesitic tuff breccia.

Crozier soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is gravelly clay loam over weathered andesitic tuff breccia.

Ledmount soils are shallow and well drained soils. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam over andesitic tuff breccia.

Areas of this unit are used mainly for timber production. The flatter areas are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

The Crozier and McCarthy soils in this unit have low to moderate available water capacity and moderate to high timber productivity.

II. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF HIGH ELEVATION MOUNTAINSIDES

The soils in this group are excessively drained to moderately well drained. They formed in material weathered from volcanic, metasedimentary, and granitic rock, as well as glacial or alluvial deposits. Rock outcrops are numerous in many areas. Glaciated rockland also occurs throughout the area. Slopes range from 2 to 75 percent.

These soils are along the crest of the Sierra Nevada, at elevations of 5,400 to 10,000 feet. The annual precipitation is 35 to 80 inches, and the frost-free growing season is 25 to 125 days.

Two map units and one miscellaneous land type are in this group. They make up about 48 percent of the survey area.

4 - Tallac-Smokey-Meiss

Deep, moderately deep, and shallow, nearly level to very steep, moderately well drained to somewhat excessively drained soils on moraines, outwash terraces, and mountainsides.

This map unit is on the sides of the ridges of the Sierra Nevada crest and in valleys between. The soils formed in materials weathered from glacial alluvial deposits, meta-sedimentary rocks of the Calaveras Formation, and andesitic tuff breccia mudflows of the Mehrten Formation. Elevations range from 5,500 to 10,000 feet.

Important soils in this unit are the Tallac, Smokey, and Meiss soils. Other soils are of minor extent.

Tallac soils are deep and moderately well drained. Slopes range from 2 to 60 percent. Typically the surface layer is very gravelly sandy loam. The underlying material is extremely gravelly loam over cemented till. Gravel and cobbles in excess of 35 percent are found throughout most of the profile.

Smokey soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically surface layer is gravelly sandy loam. The subsoil is very gravelly loam over weathered metasedimentary rock.

Meiss soils are shallow and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam over hard volcanic rock.

Areas of this unit are used mainly for timber production and range forage. The flatter ridgetops and benches with deep and moderately deep soils are generally harvested

by tractor. The steeper mountainsides are harvested by aerial systems. The gentler slopes with shallow soils are used for summer range.

The soils in this map unit have moderate to very low available water capacity and have moderate to low timber productivity. The shallow soils which are primarily used for range land are not suitable for timber production.

5 - Bucking-Ledford

Deep, nearly level to very steep, somewhat excessively drained and excessively drained soils on mountainsides.

This map unit is on the sides of mountains. The soils formed in materials weathered from granitic rocks. Elevations range from 5,000 to 9,000 feet.

Important soils in this unit are the Bucking and Ledford soils. Other soils are of minor extent.

Bucking soils are deep and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is loamy sand. The underlying material is loamy sand over highly weathered granitic rock.

Ledford soils are deep and excessively well drained. Slopes range from 2 to 75 percent. Typically the surface layer is fine sandy loam. The underlying material is very gravelly sandy loam over highly weathered granitic rock.

The soils in this map unit have high to very high timber productivity. Slopes less than 30 percent are generally tractor logged, and the steeper slopes are harvested by aerial systems. These soils are very susceptible to erosion when vegetation and litter are removed.

All soils in this map unit have low to moderate available water capacity and have high to very high timber productivity.

6 - Fugawee-Waca-Ahart

Moderately deep, nearly level to very steep, well drained soils on mountainsides.

This map unit is on the mountainsides of the Sierra Nevada crest and the higher elevations of the eastern slopes. The soils formed in material weathered from volcanic rocks, andesitic tuff breccia mudflows of the Mehrten Formation, and rhyolitic tuff breccia of the Valley Springs Formation. Elevations range from 5,500 to 9,000 feet.

Important soils in this unit are the Fugawee, Waca, and Ahart soils. Other soils are of minor extent.

Fugawee soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam. The subsoil is gravelly clay loam over weathered andesite.

Waca soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The underlying material is very gravelly sandy loam over weathered andesitic tuff breccia. Gravel is in excess of 35 percent throughout the profile.

Ahart soils are moderately deep and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is gravelly sandy loam. The underlying material is gravelly fine sandy loam over weathered rhyolitic tuff.

Areas of this unit are used mainly for timber production. The flatter slopes are generally harvested by tractor, and the steeper slopes are harvested by aerial systems.

Soils in this map unit have low to moderate available water capacity and low to high timber productivity.

7 - Rock outcrop

Nearly level to very steep Rock outcrop and areas of rockland.

This map unit is located throughout the Sierra Nevada crest zone where erosion or glaciation has exposed the underlying bedrock. Rock outcrops may be volcanic, granitic, rhyolitic, ultra basic, or metasedimentary. Elevations range from 5,400 to 10,000 feet.

This map unit makes up about 5 percent of the survey area.

Other soils in this unit are predominantly soils of glacial origin. Waterbodies and poorly drained soils such as Aquolls, Borolls, and Cryumbrepts, wet, are also included.

This unit can be found in minor extent throughout all the other mapping units.

Areas of this unit are used mainly for watershed, wildlife habitat, and recreation.

III. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF THE EASTSIDE

The soils in this group are somewhat excessively drained to well drained. They formed in material weathered from volcanic, rhyolitic, and granitic rock, and alluvial deposits. Rock outcrops are numerous in many areas. Slopes range from 2 to 75 percent.

These soils are on the lower slopes of the eastern Sierra Nevada, Bald Mountain, and Verdi ranges, at elevations of 4,800 to 6,500 feet. The annual precipitation is 15 to 40 inches, and the frost-free growing season is 20 to 75 days.

Three map units are in this group. They make up about 19 percent of the survey area.

8 - Euer-Martis

Deep and very deep, nearly level to steep, well drained soils on glacial terraces.

This map unit is north and south of the Truckee River east of Truckee. The soils formed in materials weathered from glacial deposits of Donner age. Elevations range from 5,000 to 6,500 feet.

Important soils in this unit are the Euer and Martis soils. Other soils are of minor extent.

Euer soils are deep and well drained. Slopes range from 2 to 30 percent. Typically the surface layer is sandy loam. The subsoil is very gravelly sandy clay loam and the underlying material is extremely gravelly sandy loam.

Martis soils are deep and very deep, and well drained. Slopes range from 2 to 5 percent. Typically the surface layer sandy loam. The subsoil is gravelly sandy clay loam over highly weathered glacial deposits. The subsoil contains a layer of very high bulk density.

Areas of this unit are used for limited timber production and range forage. Timber harvest is by tractor.

Available water capacity is low due to gravel content or limited effective rooting depth.

9 - Aldi-Franktown-Kyburz

Shallow and moderately deep, nearly level to very steep, and well drained soils on mountainsides.

This map unit is on mountainsides. The soils formed in materials weathered from basic volcanic rocks. Elevations range from 4,800 to 6,500 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Aldi, Franktown, and Kyburz soils. Other soils are of minor extent.

Aldi soils are shallow and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered andesite.

Franktown soils are shallow and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly loam and extremely gravelly coarse sandy clay loam over weathered volcanic rock.

Kyburz soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over weathered andesitic rock.

The Kyburz soils in this map unit have low to very low timber productivity. The Aldi and Franktown soils are moderately productive range soils when used for unimproved range. Slopes less than 30 percent are generally tractor logged, and the steeper slopes are harvested by aerial systems.

Soils in this map unit have very low to moderate available water capacity. Aldi and Franktown soils are not considered to be timber producing soils.

10 - Trojan-Kyburz-Portola

Very deep, deep, and moderately deep, level to very steep, well drained soils on mountainsides.

This map unit is on mountainsides. The soils formed in materials weathered from basic and acidic rocks. Elevations range from 4,800 to 8,000 feet.

Important soils in this unit are the Trojan, Kyburz, and Portola soils. Other soils are of minor extent.

Trojan soils are deep and very deep, and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over andesite.

Kyburz soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over weathered andesitic rock.

Portola soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface

layer is gravelly line sandy loam. The subsoil is gravelly sandy loam over weathered rhyolite.

The soils in this map unit have moderate to very low timber productivity. Slope, less than 30 percent are generally tractor logged, and the steeper slopes are harvested by aerial systems.

Soils in this map unit have low to high available water capacity and moderate to low timber productivity. Low precipitation is a major factor in determining productivity.

Detailed Soil Map Units

The map unit symbols on the soil maps are described in this section. The map unit descriptions, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses.

Each map unit on the soil maps represents an area on the landscape and consists of one or more soils for which the unit is named. The symbol from the soil map precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses. The map unit descriptions are arranged alphabetically by symbol.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer or of the underlying material, all soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the soil maps are phases of a soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Fugawee sandy loam, 2 to 30 percent slopes, is one of the several phases in the Fugawee series. A soil variant is a soil having properties sufficiently different from other known soils to justify a new series name but making up such a limited geographic area that establishing a new series is not justified.

Erosion phases used in this report are eroded and severely eroded. The eroded phase is used when part, but not generally all, of the A horizon or surface layer has been removed from the soil. The severely eroded phase is used when most all of the A horizon or surface layer has been removed and the subsoil is exposed. In many places, a part of the subsoil is also removed.

Other phases used in this report are altered and terraced. The altered phase is used for soils when much of the surface layer has been displaced into windrows or piles. The terraced phase is used for soils on which contoured furrows or ditches have been constructed.

Many map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

Soil complex consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes, is an example.

Soil association is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Cinder land is an example. Miscellaneous areas are described in the map units, but they are not rated for soil management interpretations.

The Soil Map Unit Legend, Map Unit Area and Proportionate Extent Table (Table 2) at the back of this report gives the acreage and proportionate extent of each map unit.

Explanations of entries in the map unit descriptions are explained next.

Soil Map Unit Component. The name of each major soil or miscellaneous area.

Approximate Proportion. The portion of the map unit occupied by each component.

Surface Layer. The uppermost part of the soil, usually designated as the A horizon, equivilent to the depth of soil moved in tillage and ranging in depth from 3 to 10 inches.

Subsoil. The soil between the surface layer and the uppermost substratum. All parts of B horizons above 80 inches, and any parts of A or C horizons between the surface layer and 40 inches or a more shallow substratum, are subsoil.

Substratum. A layer below 40 inches, or beneath the solum if the lower part of the solum is between 40 and 80 inches deep. Any parts of the solum below 80 inches are substrata. Bedrock, hardpan, and unconsolidated geologic materials that are in contrasting particle-size classes relative to the surface soil or solum are substrata regardless of depth.

Effective Rooting Depth. The vertical distance from the soil surface to bedrock or any other layer that stops or hinders that penetration of roots.

Available Water Capacity Class. The capacity of the soil to hold water available for use by most plants. It is expressed as total inches of water for the effective rooting depth or to 60 inches. The 5 classes and their ratings are:

Very low is less than 3 inches
Low is 3 to 6 inches
Moderate is 6 to 9 inches
High is 9 to 12 inches

AWC for top 20" is the water capacity in a typical soil profile to a depth of 20 inches or to bedrock, whichever is less, available to plants. This moisture content is used in evaluating the probability of seedling survival for revegetation on specific soils.

On soils with an AWC of greater than 3.0 inches, almost all planted seedlings would survive.

On soils with an AWC between 2.0 and 3.0, most planted seedlings would survive.

On soils with an AWC between 1.0 and 2.0 inches, few planted seedlings would survive. The primary limiting factors of these soils are shallow soils and/or high percentage of rock fragments.

On soils with an AWC of less than 1.0 inch, very few planted seedlings would survive. The soils are shallow and have a very high rock fragment content.

Permeability. Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior. The ratings of permeability are very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.

Drainage Class. Drainage class refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious

layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artifically drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Maximum Erosion Hazard

Many land use activities have the potential to cause erosion rates to exceed natural soil erosion or soil formation rates. Potential consequences of accelerated erosion include reductions in the productive capacity of the soil and adverse effects on water quality. Many interrelated factors are evaluated in an EHR system to determine whether land use activities would cause accelerated erosion, and to what degree accelerated erosion would cause adverse effects. it is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, or mass wasting.

The adjective erosion hazard ratings are described below in terms of the likelihood and consequences of accelerated erosion. As the risk of accelerated erosion increases, so does the likelihood that accelerated erosion will exceed soil formation rates. The risk and consequence becomes especially critical for shallow and moderately deep soils over consolidated materials.

The maximum EHR are based on little or no vegetative cover present and on the long-term average occurrence of 2-year, 6-hour storm events. Erosion hazard risks are greater when storm frequency, intensity and/or duration exceed long-term average occurrence, and risks are less when occurrence is below "average". The risks and consequences for adjective erosion hazard ratings are described below.

Low EHR. Accelerated erosion is not likely to occur, except in the upper part of the Low EHR numerical range, or during periods of above average storm occurrence. If accelerated erosion does occur, adverse effects on soil productivity and to nearby water quality are not expected. Erosion control measures are usually not needed for these areas.

Moderate EHR. Accelerated erosion is likely to occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality may occur for the upper part of the Moderate EHR numerical range, or during periods of above average storm occurrence. The need for erosion control should be evaluated for these areas. A wide selection of measures and application methods are available.

High EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality are likely to occur, especially during periods of above average storm occurrence. Erosion control is necessary for these areas to prevent accelerated erosion. The selection of measures and methods of application are somewhat limited.

Very high EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity and to nearby water quality are very likely to occur, even during periods of below average storm occurrence. Erosion control is essential for these areas to prevent accelerated erosion. The selection of measures and methods of application are limited.

Equipment Limitations. Ratings of equipment limitations (4) reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of slight indicates that use of equipment is not limited to a particular kind of equipment or time of year; moderate indicates a short seasonal limitation or a need for some modification in management or in equipment; and severe indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling Mortality. Rating of seedling mortality (5) indicates the degree to which the soil affects the mortality of tree seedlings growing on a south aspect. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A south aspect is used to determine the rating because this aspect normally has the highest mortality due to temperature and moisture stresses. Ratings are normally lower for the other aspects. A rating of slight indicates that no problem is expected under normal conditions; moderate indicates that extra precautions are advisable; and severe indicates that precautions are important and replanting may be necessary.

Soil properties that commonly influence seedling mortality include texture, the amount of rock fragments, temperature, and drainage. Soils with available water capacities (AWC) of less than 2.5 inches in the upper 24 inches of the soil cause severe limitations for seedlings, especially on south and west facing slopes below 6,000

feet. Low available water capacity is less critical at the higher elevations where the potential plant water use is generally less. Species selection, type of planting stock, competition from undesirable plants, type of site preparation, and the available water capacity and rock fragment content of the soil need to be considered when reforesting soils at higher elevations.

Revegetating Exposed Subsoil. A rating of revegetating exposed subsoil (5) indicates the degree of difficulty in revegetating exposed subsoil. Subsoil horizons are frequently exposed during forest management activities. This occurs on road cuts and fills, and on some skid roads. Land managers may desire to revegetate these areas. Characteristics of the subsoil which influence planting conditions, germination, and subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for on-site investigation of individual projects.

A rating of slight indicates there are few problems with revegetation. If locally adapted grasses are properly seeded, a good stand can be expected to reduce surface erosion. If trees are planted, good survival and growth can be expected. Natural revegetation will be better on these subsoils than on those with moderate or severe ratings. Moderate indicates that additional care is needed in choosing methods or types of plants for erosion control. If trees are planted, some mortality can be expected and growth rates will be below those on undistrubed areas. Severe indicates that intensive and expensive measures would be needed to establish erosion control plants. Some soils with a severe rating have little need for erosion control plantings because the exposed areas have large amounts of hard rock with only a small amount of erodible soils. Tree planting would be very difficult, survival would be low, or growth rates would be very slow or greatly reduced below those of undistrubed areas. On site evaluation is essential when considering revegetation on severe sites.

Soil Productivity.

Forest survey site class. The timber productivity of the soil components is expressed by the Forest Survey Site Class (FSSC). The FSSC estimated for each soil component is an average over the map unit. Site index values were obtained by using available site index data and appropriate guides for converting into FSSC. On a specific site in the map unit, FSSC might be more or less than what is given in the report. FSSC is an expression of the volume of bole wood produced on an acre in one year in a normal even-aged stand at culmination mean annual increment. Below are the seven FSSC's and their corresponding volume in cubic feet per acre:

1	greater than 225
2	165 to 225
3	120 to 165
4	85 to 120
5	50 to 85
6	20 to 50
7	less than 20

The term NC means not capable of growing commercial conifer species.

Annual Forage. The production of forage is expressed in pounds per acre of grasses, forbs, and browse. A range of productivity is given to reflect different site conditions and for forested soils, to reflect an unharvested state ranging to conditions 10 years after harvesting. Only slopes of less than 50 percent are rated.

Soil Manageability. The ease of managing land depends on the kinds and intensities of cultivation and harvest techniques. It is also dependent on soil and topographic features, although the importance of these features is related to the type of management system. Soil mangeability classificaton rates soils and their topography on the basis of features which reduce the ease of equipment operation and increase required soil protection measures for most systems, particularly those commonly practiced in forestry and intensive range management.

CLASSES. The soil manageability classes are based on soil and topographic features and are applied to the individual soils of a map unit. Soils are classified on the basis of ease of equipment operation and need for soil protection measures. Miscellaneous land types, such as Rock outcrop, are not rated. Classes are designated by arabic numerals and may have management modifiers designated by letters.

Class 1. - Easy to manage. Soils in this class are on stable slopes of less than 30 percent. They are moderately deep or deep an do not have any more than slight management problems. Management modifiers are not applied to this class.

Class 2. - Readily mangeable. Soils in this class are on slopes of less than 30 percent, and have a moderate management modifier (designated by lowercase letters), such as moderate erosion potential.

Class 3. - Moderately difficult to manage. Soils in this class are on steep slopes (30 to 50 percent), or have asubstantial management modifier (designated by uppercase letters), or both.

Class 4. - Very difficult to manage. Soils in this class are on very steep slopes (greater than 50 percent), or have more than one substantial management modifier, or have been altered, terraced, or severely eroded.

The management modifiers are:

"S" if the slope stability is low and "s" if it is moderate.
"E" if the maximum erosion hazard is high or very high and "e" if it is moderate.
"D" if the soil depth is less than 10 inches and "d" if it is 10 to 20 inches.
"P" if the upper 20 inches of soil has an available water capacity of less than 1.2 inches and "p" if it is 1.2 to 2.4 inches.
"W" if the soil is poorly drained and "w" if it is somewhat poorly drained.
"X" if cobbles or stones comprise greater than 15 percent of the surface and "x" if they comprise 3 to 15 percent of the surface.

GROUPS. Land management planners dealing with Forests and larger areas may not be concerned with every soil taxonomic unit, or individual components of soil map units. They generally want to avoid the complications of having more than one soil manageability symbol for a delineation or a soil map unit. Therefore, soil manageability groups have been developed for utilization in broad planning. The groups rate soil map units and only one group applies to a map unit, whereas soil manageability classes rate map unit components and as many classes may apply to a map unit as there are major components in the map unit.

The groups are ratings for the map unit and are determined by the soil manageability classes which were applied to the map unit components. They are designated by Roman numerals in order to distinguish then from soil manageability class symbols, which are designated by Arabic numerals. A map unit is always placed in the group with the lowest numeral in cases where the group definitions would allow it to be in more than one soil manageability group.

Group IA. - Class 1 components predominate with less than 30 percent of class 2, and less than 10 percent of class 3 and 4 components.

Group I. - Class 1 components predominate, with less than 50 percent of class 2, less than 20 percent of class 3, and less than 10 percent of class 4 components by area.

Group II. - Class 2 components predominate with less than 50 percent of class 3 components and less than 20 percent of class 4 components by area.

Group III. - Class 3 components predominate, with less than 40 percent of class 4 components by area.

Group IV. - Class 4 components predominate, or occupy at least 40 percent of the map unit area.

Management group modifiers where assigned to each group based on the following criteria:

E Components rated E make up at least 50-percent of the map unit.
e Components rated e make up at least 50 percent of the map unit.

X Rock outcrop makes up at least 40 percent of the map unit, or if components rated X make up at least 40 percent of the map unit, or if Rock outcrop plus the components rated X make up at least 40 percent of the unit.
x Rock outcrop makes up 10 to 39 percent of the map unit, or if Rock outcrop plus the components rated X make up 10 to 39 percent of the unit.

W Components rated W make up at least 50 percent of the map unit.
w Components rated w make up at least 10 percent of the map unit and the percentage is greater than the percentage rated X.

D Components rated D make up at least 40 percent of the map unit.
d Components rated d make up at least 40 percent of the map unit.

P Components rated P make up at least 40 percent of the map unit, or if components rated P plus D make up at least 40 percent of the map unit.
p Component rated p make up at least 40 percent of the map unit, or if components rated p plus d make up at least 40 percent of the map unit.

G Slope gradient in the map unit is greater than 50 percent.
g Slope gradient in the map unit is 30 to 50 percent.

ACE Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Red Fir Series; Mixed conifer series	
Soil Map Unit Components	**Ahart**	**Waca, rhyolitic substratum**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.	14 to 32 inches; brown very gravelly sandy loam; weak subagular blocky structure; slightly acid.
Substratum	31 inches; weathered rhyolitic tuff.	32 inches; weathered rhyolitic tuff.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Low
AWC for top 20”	2.5-2.8	2.1-2.3
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Slight	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, 4 RF, WR 100 to 180	 4, 5 RF, WF 60 to 140
Soil Manageability Group Class	 II 2e	 II 2ep
Inclusions	Included in this unit are small areas of Tallac, Tinker, and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; and similar soils with ochric epipedons. Included areas make up about 10 percent of the total area.	
Management Considerations	Moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments.	

ACF Ahart-Waca, rhyolitic substratum complex, 30 to 50 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Red Fir Series; Mixed conifer series	
Soil Map Unit Components	**Ahart**	**Waca, rhyolitic substratum**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.	14 to 32 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.
Substratum	31 inches; weathered rhyolitic tuff.	32 inches; weathered rhyolitic tuff.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Low
AWC for top 20”	2.5-2.8	2.1-2.3
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, 4 RF, WF 100 to 180	 4, 5 RF, WF 60 to 140
Soil Manageability Group Class	 III 3E	 III 3Ep
Inclusions	Included in this unit are small areas of Tinker and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; and similar soils with ochric epipedons. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes and moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments.	

ADE Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Ahart	Waca, rhyolitic substratum	Cryumbrepts, wet
Proportion (percent)	50	30	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam; silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.	14 to 32 inches; brown very gravelly sandy loam; weak subagular blocky structure; slightly acid.	
Substratum	31 inches; weathered rhyolitic tuff.	32 inches; weathered rhyolitic tuff.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	Variable
Available Water Capacity Class	Low	Low	Low
AWC for top 20”	2.5-2.8	2.1-2.3	
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	Moderate	Moderate	Very high
Seedling Mortality	Slight	Slight to moderate	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, 4 RF, WF 100 to 180	 4, 5 RF, WF 60 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 II 2e	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Tallac, Tinker and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; and similar soils with ochric epipedons. Included areas make up about 15 percent of the total area.

Management Considerations: Moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and normally have impermeable layers between 1 and 2 feet.

ADF Ahart-Waca, rhyolitic substratum-Crumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series

Soil Map Unit Components	Ahart	Waca, rhyolitic substratum	Cryumbrepts, wet
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam; silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.	14 to 32 inches; brown very gravelly sandy loam; weak subagular blocky structure; slightly acid.	
Substratum	31 inches; weathered rhyolitic tuff.	32 inches; weathered rhyolitic tuff.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	Variable
Available Water Capacity Class	Low	Low	Very low
AWC for top 20”	2.5-2.8	2.1-2.3	
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Slight	Moderate to slight	Severe
Revegetating Exposed Subsoil	Slight	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, 4 RF, WF 100 to 180	 4, 5 RF, WF 60 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 III 3e	 III 3ep	 III 4EW

Inclusions: Included in this unit are small areas of Tallac, Tinker and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; similar soils with ochric epipedons; and soils that are loamy-skeletal with umbric epipedons and are less than 20 inches deep to cemented glacial till. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

AEE Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes

	Elevation: 5,500 to 8,000 feet	Annual Precipitation: 50 to 70 inches	
Typical Vegetation	Red fir-Mixed brush series; Mixed conifer-Mixed brush series		
Soil Map Unit Components	**Ahart**	**Rock outcrop**	**Ledmount Variant**
Proportion (percent)	35	25	25
	Soil Profile Description		
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	Rhyolitic rock outcrop	0 to 19 inches; dark grayish brown very gravelly sandy loam; weak granular structure: slightly acid.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.		
Substratum	31 inches; weathered rhyolitic tuff.		19 inches; hard rhyolitic rock.
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40		11 to 19
Available Water Capacity Class	Low		Very low
AWC for top 20”	2.5-2.8		1.4-1.6
Permeability: Subsoil Substratum	Moderately rapid Moderately slow		Moderately rapid Slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	Moderate		Moderate
Seedling Mortality	Slight		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, 4 RF, WF 100 to 180		 Not capable 160 to 270
Soil Manageability Group Class	 II 2e		 II 2ed
Inclusions	Included in this unit are small areas of Tallac, Tinker and Waca soils. Included areas make up about 15 percent of the total area.		
Management Considerations	Ahart soils are moderately deep. Ledmount Variant soils are shallow to hard bedrock and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.		

AEF Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes

	Elevation: 5,500 to 8,000 feet	Annual Precipitation: 50 to 70 inches	
Typical Vegetation	Mixed conifer-Mixed brush series; Red fir-Mixed brush series		
Soil Map Unit Components	**Ahart**	**Rock outcrop**	**Ledmount Variant**
Proportion (percent)	30	30	25
	Soil Profile Description		
Surface Layer	0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	Rhyolitic rock outcrop	0 to 19 inches; dark grayish brown very gravelly sandy loam; weak granular structure: slightly acid.
Subsoil	8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.		
Substratum	31 inches; weathered rhyolitic tuff.		19 inches; hard rhyolitic rock.
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40		11 to 19
Available Water Capacity Class	Low		Very low
AWC for top 20”	2.5-2.8		1.4-1.6
Permeability: Subsoil Substratum	Moderately rapid Moderately slow		Moderately rapid Slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	Moderate		Moderate
Seedling Mortality	Slight		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4, 5 RF, WF 100 to 180		 Not capable 160 to 270
Soil Manageability Group Class	 III 3E		 III 3Ed
Inclusions	Included in this unit are small areas of Tallac, Tinker and Waca soils. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep slopes. Ahart soils are moderately deep. Ledmount Variant soils are shallow to hard bedrock and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.		

AIE Aiken-Cohasset complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,500 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Mixed conifer series	
Soil Map Unit Components	**Aiken**	**Cohasset**
Proportion (percent)	70	20
Soil Profile Description		
Surface Layer	0 to 10 inches; brown and reddish brown loam; weak granular and subangular blocky structure; neutral.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	10 to 22 inches; reddish brown loam; weak subangular blocky structure; slightly acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	22 to 70 inches; red and strong brown clay; massive; medium acid to strongly acid	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	60 to 90	40 to 80
Available Water Capacity Class	Moderate to high	Moderate to high
AWC for top 20”	2.6-3.4	2.6-3.4
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 II 2e	 II 2e
Inclusions	Included in this unit are small areas of Crozier soils. Included areas make up about 10 percent of the total area.	
Management Considerations	Aiken soils have low subsoil strength when wet.	

AIE5 Aiken-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,500 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Mixed conifer series; Plantations.	
Soil Map Unit Components	**Aiken, altered**	**Cohasset, altered**
Proportion (percent)	70	20

Soil Profile Description

Surface Layer	0 to 8 inches; yellowish red loam; massive; neutral.	0 to 12 inches; brown loam; massive; neutral.
Subsoil	8 to 46 inches; red clay; moderate subangular blocky structure; neutral.	12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.
Substratum	46 inches; highly weathered tuff breccia mudflow.	65 inches; weathered mudflow.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	60 to 90	40 to 80
Available Water Capacity Class	Low to moderate	Low to moderate
AWC for top 20”	2.9-3.4	2.8-3.5
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e

Inclusions: Included in this unit are small areas of Crozier soils and unaltered Aiken and Cohasset soils. Included areas make up about 10 percent of the total area.

Management Considerations: Surface soils in the unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Aiken soils have low subsoil strength when wet.

AQB Aquolls and Borolls, 0 to 5 percent slopes

Elevation: 5,000 to 8,500 feet Annual Precipitation: 30 to 60 inches

Typical Vegetation	Meadow series; Meadow/Willow series.	
Soil Map Unit Components	**Aquolls**	**Borolls**
Proportion (percent)	45	45

Soil Profile Description

Surface Layer	Thick and dark colored; stratified coarse sand to clay.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	Stratified layers with mottles; sandy loam to clay; some are very gravelly.	Stratified sandy loam to clay; some very gravelly.
Substratum	Stratified alluvium.	Stratified alluvium.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	10 to 30	10 to 30
Available Water Capacity Class	Variable	Very low
AWC for top 20”		
Permeability: Subsoil Substratum	Variable Slow and very slow	Variable Moderately slow and slow
Drainage Class	Very poorly drained	Poorly drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe	Severe
Revegetating Exposed Subsoil	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 1,040 to 2670	 Not capable 1,040 to 2,670
Soil Manageability Group Class	 IV 4EW	 IV 3eW
Inclusions	Included in this unit are small areas of Celio and Gefo soils, Rock outcrop, and soils less than 20 inches deep. Included areas make up about 10 percent of the total area.	
Management Considerations	This map unit is subject to flooding. Aquolls have a high water table during most of the year and are susceptible to puddling. Borolls have high water tables during part of the year, are susceptible to puddling, and have high amounts of rock fragments.	

ARE Aldi-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Sagebrush/Bitterbrush-Mixed conifer series.	
Soil Map Unit Components	**Aldi**	**Kyburz**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 8 inches; brown loam; weak granular stucture; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	18 inches; weathered andesite.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	10 to 20	20 to 40
Available Water Capacity Class	Very low to low	Low
AWC for top 20”	2.7-3.3	2.2-2.7
Permeability: Subsoil Substratum	Slow Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 120 to 190	 Not capable 120 to 190
Soil Manageability Group Class	 II 2ed	 II 2ep
Inclusions	Included in this unit are small areas of Franktown and Trojan soils; Rock outcrop; soils similar to Aldi but with fine-loamy textures in the subsoil; soils simliar to Aldi but with a paralithic contact; and soils similar to Kyburz but with mollic epipedons.Included areas make up about 15 percent of the total area.	
Management Considerations	Aldi soils are shallow to hard bedrock. They have very low subsoil strength when wet. The subsoil tends to perch water during spring. These soils reach field capacity rapidly and can produce surface runoff. Kyburz soils are moderately deep, have thin surface layers, and a relatively short growing season.	

BCE Bucking-Bucking Variant, 2 to 30 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Bucking**	**Bucking Variant**
Proportion (percent)	50	20
Soil Profile Description		
Surface Layer	0 to 11 inches; brown loamy sand; weak granular stucture; slightly acid.	0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid.
Subsoil	11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid.	11 to 29 inches; pale brown loamy coarse sand; massive; medium acid.
Substratum	51 inches; highly weathered granitic rock.	29 inches; weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	20 to 40
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.2-1.6	1.2-1.6
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow
Drainage Class	Somewhat execessively drained	Somewhat excessively drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe to moderate	Severe to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 RF, WF 140 to 180	 4 RF, WF 100 to 140
Soil Manageability Group Class	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Celio Variant soils; Rock outcrop; similar soils which are pachic; and similar soils that are moderately deep or deep and have ochric epipedons.Included areas make up about 30 percent of the total area.	
Management Considerations	Sandy soil textures and relatively low cation exchange capacity (CEC).Bucking Variant soils are moderately deep.	

BCG Bucking-Bucking Variant complex, 30 to 75 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Bucking**	**Bucking Variant**
Proportion (percent)	50	20
Soil Profile Description		
Surface Layer	0 to 11 inches; brown loamy sand; weak granular stucture; slightly acid.	0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid.
Subsoil	11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid.	11 to 29 inches; pale brown loamy coarse sand; massive; medium acid.
Substratum	51 inches; highly weathered granitic rock.	29 inches; weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	20 to 40
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.2-1.6	1.2-1.6
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow
Drainage Class	Somewhat execessively drained	Somewhat excessively drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe to moderate	Severe to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 RF, WF 140 to 180	 4 RF, WF 100 to 140
Soil Manageability Group Class	 IV 4Gp	 IV 4Gp
Inclusions	Included in this unit are small areas of Celio Variant soils; Rock outcrop; similar soils that are pachic; and similar soils that are moderately deep or deep and have ochric epipedons.Included areas make up about 30 percent of the total area.	
Management Considerations	Steep and very steep slopes. Sandy soil textures and relatively low cation exchange capacity (CEC).Bucking Variant soils are moderately deep.	

BDE Bucking-Bucking Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red-fir-Alder/Willow series.

Soil Map Unit Components	Bucking	Bucking Variant	Cryumbrepts, wet
Proportion (percent)	45	20	15
Soil Profile Description			
Surface Layer	0 to 11 inches; brown loamy sand; weak granular stucture; slightly acid.	0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly or stony.
Subsoil	11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid.	11 to 29 inches; pale brown loamy coarse sand; massive; medium acid.	
Substratum	51 inches; highly weathered granitic rock.	29 inches; weathered granitic rock.	Stratified loam to clay loam with dark colord mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.2-1.6	1.2-1.6	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe to moderate	Severe to moderate	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF, WF 140 to 220	 4 RF, WF 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Celio Variant soils; Rock outcrop; similar soils that are pachic; and similar soils that are moderately deep or deep and have ochric epipedons. Included areas make up about 20 percent of the total area.

Management Considerations: Sandy soil textures and relatively low cation exchange capacity (CEC).Bucking Variant soils are moderately deep. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1and 2 feet.

BDF Bucking-Bucking Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red-fir-Alder/Willow series.

Soil Map Unit Components	Bucking	Bucking Variant	Cryumbrepts, wet
Proportion (percent)	45	20	15
Soil Profile Description			
Surface Layer	0 to 11 inches; brown loamy sand; weak granular stucture; slightly acid.	0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly or stony.
Subsoil	11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid.	11 to 29 inches; pale brown loamy coarse sand; massive; medium acid.	
Substratum	51 inches; highly weathered granitic rock.	29 inches; weathered granitic rock.	Stratified loam to clay loam with dark colord mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.2-1.6	1.2-1.6	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe to moderate	Severe to moderate	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF, WF 140 to 220	 4 RF, WF 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Celio Variant soils; similar soils that are pachic; and similar soils that are moderately deep or deep and have ochric epipedons. Included areas make up about 20 percent of the total area.

Management Considerations: Steep slopes. Sandy soil textures and relatively low cation exchange capacity (CEC).Bucking Variant soils are moderately deep. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1and 2 feet.

BME Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes

Elevation: 5,000 to 5,800 feet Annual Precipitation: 14 to 18 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Poderosa series.

Soil Map Unit Components	Badenaugh	Martineck	Dotta
Proportion (percent)	35	30	20
Soil Profile Description			
Surface Layer	cobbly loam; weak and moderate granualr structure; neutral.	0 to 6 inches; brown extremely stony sandy loam; weak platy structure; medium acid.	0 to 6 inches; grayinsh loam; moderate platy structure; slightly acid.
Subsoil	6 to 27 inches; brown very cobbly clay loam; moderate subangular blocky structure; slightly acid.	6 to 19 inches; brown extremely stony sandy clay loam; strong prismatic structure; medium acid.	13 to 41 inches; grayish brown sandy clay loam; weak prismatic structure; slightly acid.
Substratum	27 to 60 inches; brown extremely cobbly sandy clay loam; massive; medium acid.	19 inches; pale yellow indurated duripan.	41 to 68 inches; light brown-ish gray sandy loam. massive slightly acid.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	48 to 60	10 to 20	40 to 60
Available Water Capacity Class	Low	Very low	Low to moderate
AWC for top 20”	1.5-1.8	0.5-0.6	2.0-2.6
Permeability: Subsoil Substratum	Moderately rapid Moderately rapid	Very slow Very slow	Moderately slow Moderate
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Severe to moderate	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 120 to 190	 Not capable 60 to 120	 Not capable 190 to 250
Soil Manageability Group Class	 III 2pX	 III 4epX	 III 2p

Inclusions: Included in this unit are small areas of deep soils with fine textured subsoils and deep soils that are fine-loamy and have aquic moisture regime. In the vicinity of Verdi, the soils in this unit are more moist than normal. Included areas make up about 15 percent of the total area.

Management Considerations: Low annual rainfall and a relatively short growing season. These soils reach field capacity rapidly and can produce surface runoff. Badenaugh soils have high amounts of rock fragments. Martineck soils are shallow to a hardpan, have high amounts of rock fragments and surface stones, and have low subsoil strength when wet.

BSE Boomer-Boomer Variant-Sites complex, 2 to 30 percent slopes

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Boomer	Boomer Variant	Sites
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 3 inches; brown sandy loam; moderate granular structure; medium acid.	0 to 9 inches; brown cobbly sandy loam; strong granualr structure; slightly acid.	0 to 9 inches; reddish brown clay loam; moderate subagular blocky structure; slightly acid.
Subsoil	3 to 60 inches; reddish yellow sandy clay loam; massive medium acid.	9 to 90 inches; red very cobbly clay loam; weak subagular blocky structure; slightly acid.	9 to 45 inches; yellowish red gravelly clay; strong subagular blocky structure; medium acid.
Substratum			45 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 65	50 to 90	40 to 65
Available Water Capacity Class	Moderate to high	Low	Low to moderate
AWC for top 20”	3.1-3.6	1.4-2.0	2.6-3.1
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow	Moderately slow to slow Slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	Moderate	High
Seedling Mortality	Slight	Severe to moderate	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, DF 240 to 640	 2, P DF 240 to 440	 1,2 P, DF 240 to 640
Soil Manageability Group Class	 II 2e	 II 3epX	 II 2e

Inclusions: Included in this unit are small areas of Jocal soils; soils similar to Boomer but with clay in the subsoil; and similar soils without argillic horizons; also small areas having up to 80 inches of precipitation. Included areas make up about 10 percent of the total area.

Management Considerations: Boomer Variant soils have a high amount of rock fragments. Sites soils have low subsoil strength when wet.

BSF Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.		
Soil Map Unit Components	**Boomer**	**Boomer Variant**	**Sites**
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 3 inches; brown sandy loam; moderate granular structure; medium acid.	0 to 9 inches; brown cobbly sandy loam; strong granualr structure; slightly acid.	0 to 9 inches; reddish brown clay loam; moderate subagular blocky structure; slightly acid.
Subsoil	3 to 60 inches; reddish yellow sandy clay loam; massive medium acid.	9 to 90 inches; red very cobbly clay loam; weak subagular blocky structure; slightly acid.	9 to 45 inches; yellowish red gravelly clay; strong subagular blocky structure; medium acid.
Substratum			45 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 65	50 to 90	40 to 65
Available Water Capacity Class	Moderate to high	Low	Low to moderate
AWC for top 20”	3.1-3.6	1.4-2.0	2.6-3.1
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow	Moderately slow to slow Slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Severe to moderate	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, DF 240 to 640	 2, P DF 240 to 440	 1,2 P, DF 240 to 640
Soil Manageability Group Class	 III 3E	 III 4EpX	 III 3E
Inclusions	Included in this unit are small areas of Jocal soils; soils similar to Boomer but with clay in the subsoil; and similar soils without argillic horizons; also small areas having up to 80 inches of precipitation.		
Management Considerations	Steep slopes. Boomer Variant soils have a high amount of rock fragments. Sites soils have low subsoil strength when wet.		

BSG Boomer-Boomer Variant complex, 50 to 75 percent slopes

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Boomer**	**Boomer Variant**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 3 inches; brown sandy loam; moderate granular structure; medium acid.	0 to 9 inches; brown cobbly sandy loam; strong granualr structure; slightly acid.
Subsoil	3 to 60 inches; reddish yellow sandy clay loam; massive medium acid.	9 to 90 inches; red very cobbly clay loam; weak subagular blocky structure; slightly acid.
Substratum		
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 65	50 to 90
Available Water Capacity Class	Moderate to high	Low
AWC for top 20”	3.1-3.6	1.4-2.0
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Severe to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, DF Not rated	 2 P, DF Not rated
Soil Manageability Group Class	 III 3E	 III 4EpX
Inclusions	Included in this unit are small areas ofsoils similar to Boomer but with a clay subsoil; soils less than 40 inches deep; and soils without argillic horizons; also small areas with up to 80 inches of precipitation.Included areas make up about 15 percent of the total area.	
Management Considerations	Very steep slopes. Boomer Variant soils have a high amount of rock fragments.	

CEE Celio-Gefo-Aquolls complex, 2 to 30 percent slopes

Elevation: 6,200 to 6,800 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation: Lodgepole-Meadow/Willow series.

Soil Map Unit Components	Celio	Gefo	Aquolls
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 15 inches; grayish brown loamy sand; weak granular structure; medium acid.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	12 to 40 inches; light yellowish brown extermely gravelly loamy coarse sand; medium acid to strong acid.	15 to 40 inches; pale brown loamy fine sand; massive; medium acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.
Substratum	40 inches; extremely gravelly loamy coarse sand; weakly cemented with silica.	40 to 60 inches; pale brown loamy fine sand; massive; medium acid.	Stratified alluvium.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	40 to 60	10 to 30
Available Water Capacity Class	Very low	Low to moderate	Variable
AWC for top 20”	1.2-1.7	1.5-2.2	
Permeability: Subsoil Substratum	Rapid Slow	Very rapid to rapid Very rapid	Variable Slow or very slow
Drainage Class	Somewhat execessively drained	Somewhat excessively drained	Very poorly drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Severe to moderate	Moderate to slight	Severe
Revegetating Exposed Subsoil	Severe	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 LP 60 to 100	 5 LP 60 to 100	 Not capable 1,040 to 2,670
Soil Manageability Group Class	 III 3pW	 III 2p	 III 4EW

Inclusions: Included in this unit are small areas of Tallac soils; soils similar to Celio which are well drained; loamy soils similar to Celio; soils similar to Gefo that are pachic; coarse-loamy soils with a hardpan above 20 inches; and soils similar to Woodseye in the Cisco Grove area. Included areas make up about 15 percent of the total area.

Management Considerations: Celio and Gefo soils have sandy textures, high amounts of rock fragments, and low cation exchange capacity (CEC). Celio soils have a cemented pan below 40 inches that holds a fluctuating water table near the surface in the spring and early summer. Gefo soils have a seasonal watertable. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Lodgepole pine is the adapted species.

CGF Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation	Hardwoods-Mixed conifer series.		
Soil Map Unit Components	**Chaix**	**Chawanakee**	**Hotaw**
Proportion (percent)	35	25	15
Soil Profile Description			
Surface Layer	0 to 9 inches; graying brown coarse sandy loam; weak granular structure; slightly acid.	0 to 5 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	9 to 29 inches; very pale brown coarse sandy loam; weak subangular blocky structure; slightly acid.	5 to 15 inches; very pale brown coarse sandy loam; massive; strongly acid.	12 to 34 inches; light yellow-ish brown sandy clay loam; moderate subangular blocky structure; medium acid.
Substratum	29 inches; weathered granodiorite.	15 inches; highly weathered granodiorite.	34 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Very low to low	Very low	Low to moderate
AWC for top 20”	1.6-2.6	1.2-2.0	2.9-3.6
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Somewhat excessively drained	Well drained
Max Erosion Hazard	High	Very high	Very high
Seedling Mortality	Severe to slight	Severe	Slight
Revegetating Exposed Subsoil	Moderate	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 DF, P 70 to 120	 7 DF, P 20 to 80	 3 DF, P 50 to 250
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 3E
Inclusions	Included in this unit are small areas of Holland soils; ridgetops with slopes of less than 30 percent; and Rock outcrop. Included areas make up about 25 percent of the total area.		
Management Considerations	Steep slopes. Chaix and Hotaw soils are moderately deep. Chaix and Chawanakee soils have coarse textures, thin surface layers, and relatively low cation exchange capacity (CEC). Chawanakee soils are shallow and reach field capacity rapidly, which can produce surface runoff.		

CHG Chawanakee-Chawanakee-Hotaw complex, 30 to 75 percent slopes

Elevation: 1,500 to 4,000 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation	Hardwoods-Mixed conifer series.		
Soil Map Unit Components	**Chawanakee**	**Chaix**	**Hotaw**
Proportion (percent)	60	15	15
Soil Profile Description			
Surface Layer	0 to 5 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.	0 to 9 inches; graying brown coarse sandy loam; weak granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	5 to 15 inches; very pale brown coarse sandy loam; massive; strongly acid.	9 to 29 inches; very pale brown coarse sandy loam; weak subangular blocky structure; slightly acid.	12 to 34 inches; light yellow-ish brown sandy clay loam; moderate subangular blocky structure; medium acid.
Substratum	15 inches; highly weathered granodiorite.	29 inches; weathered granodiorite.	34 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Very low to low	Very low	Low to moderate
AWC for top 20”	1.2-2.0	1.6-2.6	2.9-3.6
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow	Moderately slow Moderately slow
Drainage Class	Somewhat excessively drained	Well drained	Well drained
Max Erosion Hazard	Very high	High	Very high
Seedling Mortality	Severe	Severe to slight	Slight
Revegetating Exposed Subsoil	Severe	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 7 DF, P 20 to 80	 5 DF, P 70 to 120	 3 DF, P 50 to 240
Soil Manageability Group Class	 IV 4Edp	 IV 4Ep	 IV 4E
Inclusions	Included in this unit are small areas of granitic Rock outcrop; eroded areas of Chaix and Chawanakee soils; soils similar to Chaix but with a mollic epipedon; and soils similar to Holland but with a thermic soil temperature regime. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Chaix and Hotaw soils are moderately deep. Chaix and Chawanakee soils have coarse textures, thin surface layers, and relatively low cation exchange capacity (CEC). Chawanakee soils are shallow and reach field capacity rapidly, which can produce surface runoff.		

CIF Cinder land-Sierraville-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 30 to 40 inches

Typical Vegetation	Mixed conifer-Barren series; Mixed conifer-Mixed brush series.		
Soil Map Unit Components	**Cinder land**	**Sierraville**	**Kyburz**
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	Blister cones and cinder cones consisting of scoria, rock outcrop, and soil material in cracks and crevices.	0 to 9 inches; reddish brown stony loam; moderate granular structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil		9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid.	6 to 34 inches; reddish brown gravally clay loam; moderate subangular blocky structure; very strongly acid.
Substratum		75 inches; slightly weathered andesite.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		40 to 60	20 to 40
Available Water Capacity Class		Low to high	Low
AWC for top 20”		2.4-2.8	2.2-2.7
Permeability: Subsoil Substratum		Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class		Well drained	Well drained
Max Erosion Hazard		High	High
Seedling Mortality		Slight	Slight
Revegetating Exposed Subsoil		Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4,5 P, WF 120 to 190	 5,6 P 120 to 190
Soil Manageability Group Class		 III 3eX	 III 2ep
Inclusions	Included in this unit are small areas of Trojan soils and soils similar to Kyburz and Sierraville without argillic horizons. Included areas make up about 25 percent of the total area.		
Management Considerations	Steep slopes. Relatively short growing season. Sierraville soils have stones in the surface layer and a subsoil with low strength when wet. Fugawee soils are moderately deep and have a thin surface layer. Cinder land is a potential aggregate source.		

CKE Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed brush-Barren series; Red fir-Barren series; Mixed conifer-Barren series.

Soil Map Unit Components	Chaix Variant	Rock outcrop	Cryumbrepts, wet
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 10 inches; reddish yellow gravelly sandy loam; weak granular structure; medium acid.	Granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	10 to 22 inches; yellow sandy loam; massive; very strongly acid.		
Substratum	22 inches; highly weathered granodiorite.		Stratifiedloam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	1.4-2.3		
Permeability: Subsoil Substratum	Moderately rapid Moderately slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Moderate to slight		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,3 P, WF 50 to 240		 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ed		 III 4EW

Inclusions: Included in this unit are small areas of Chaix, Hotaw, and Hotaw Variant soils; soils similar to Chaix Variant but with more than 35 percent rock fragments; and soils similar to Hotaw Variant but with coarse sandy loam subsoils. Included areas make up about 25 percent of the total area.

Management Considerations: Chaix Variant soils are moderately deep, have coarse textures, thin surface layers, relatively low cation exchange capacity (CEC), and a very acid subsoil. Cryumbrepts, wet have a high watertable most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential aggregate source and produce concentrated surface runoff that can increase erosion on adjacent soils.

CKF Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Mixed brush-Alder/Willow series.

Soil Map Unit Components	Chaix Variant	Rock outcrop	Cryumbrepts, wet
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 10 inches; reddish yellow gravelly sandy loam; weak granular structure; medium acid.	Granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	10 to 22 inches; yellow sandy loam; massive; very strongly acid.		
Substratum	22 inches; highly weathered granodiorite.		Stratifiedloam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	1.4-2.3		
Permeability: Subsoil Substratum	Moderately rapid Moderately slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Moderate to slight		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,3 P, WF 50 to 240		 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ed		 III 4EW

Inclusions: Included in this unit are small areas of Chaix, Hotaw, and Hotaw Variant soils; soils similar to Chaix Variant but with more than 35 percent rock fragments; and soils similar to Hotaw Variant but with coarse sandy loam subsoils. Included areas make up about 25 percent of the total area.

Management Considerations: Steep slopes. Chaix Variant soils are moderately deep, have coarse textures, thin surface layers, relatively low cation exchange capacity (CEC), and a very acid subsoil. Cryumbrepts, wet have a high watertable most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential aggregate source and produce concentrated surface runoff that can increase erosion on adjacent soils.

COE Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,500 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Cohasset**	**Aiken**	**Crozier**
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown loam; moderate granular structure; slighly acid.	0 to 10 inches; brown and reddish brown loam; weak granular and subangular blocky structure; neutral.	0 to 15 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.	10 to 22 inches; reddish brown loam; weak subangular blocky structure; slightly acid.	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	61 inches; weathered andesitic conglomerate.	22 to 70 inches; red and strong brown clay; massive; medium acid to strongly acid.	38 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	60 to 90	20 to 40
Available Water Capacity Class	Moderate to high	Moderate to high	Low to moderate
AWC for top 20”	2.6-3.4	2.6-3.4	2.9-3.6
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate	Moderate
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 2,3 DF, P 50 to 440
Soil Manageability Group Class	 II 2e	 II 2e	 II 2e
Inclusions	Included in this unit are small areas of McCarthy soils and, in the area of Derbec Spring, soils similar to Cohasset with a dark surface layer and brown colors in the subsoil. Included areas make up about 10 percent of the total area.		
Management Considerations	Aiken soils have low subsoil strength when wet. Crozier soils are moderately deep.		

COE5 Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,500 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation	Plantations.		
Soil Map Unit Components	**Cohasset**	**Aiken**	**Crozier, altered**
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown loam; moderate granular structure; slighly acid.	0 to 8 inches; yellowish red loam; massive; neutral.	0 to 3 inches; brown loam; massive; slightly acid.
Subsoil	12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.	8 to 46 inches; red clay; moderate subangular blocky strucuture; neutral.	3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.
Substratum	65 inches; weathered mudflow.	46 inches; highly weathered tuff breccia mudflow.	38 inches; weathered tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	60 to 90	20 to 40
Available Water Capacity Class	Low to moderate	Low to moderate	Low to moderate
AWC for top 20”	2.8-3.5	2.9-3.4	2.6-3.3
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e	 IV 4e
Inclusions	Included in this unit are small areas of unaltered Aiken, Cohasset, and Crozier soils and areas of a shallow soil which is a heavily altered Crozier. Included areas make up about 10 percent of the total area.		
Management Considerations	Surface layers in this map unit have been disturbed. On-site investigations are needed to dtermine if corrective treatments are needed. Aiken soils have low subsoil strength when wet. Crozier soils are moderately deep.		

COF Cohasset-Aiken-Crozier complex, 30 to 50 percent slopes

Elevation: 2,000 to 4,500 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Black oak series.		
Soil Map Unit Components	**Cohasset**	**Aiken**	**Crozier**
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown loam; moderate granular structure; slighly acid.	0 to 10 inches; brown and reddish brown loam; weak granular and subangular blocky structure; neutral.	0 to 15 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.	10 to 22 inches; reddish brown loam; weak subangular blocky structure; slightly acid.	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	61 inches; weathered andesitic conglomerate.	22 to 70 inches; red and strong brown clay; massive; medium acid to strongly acid.	38 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	60 to 90	20 to 40
Available Water Capacity Class	Moderate to high	Moderate to high	Low to moderate
AWC for top 20”	2.6-3.4	2.6-3.4	2.6-3.4
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 2,3 DF, P 50 to 440
Soil Manageability Group Class	 III 3E	 III 3E	 III 3E
Inclusions	Included in this unit are small areas of McCarthy soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Aiken soils have low subsoil strength when wet. Crozier soils are moderately deep.		

CRB Aldi Variant-Martis Variant-Aquoll complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation: Sagebrush/Bitterbrush-Meadow/Willow series.

Soil Map Unit Components	Aldi Variant	Martis Variant	Aquolls
Proportion (percent)	35	25	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral.	0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	8 to 32 inches; brown clay; massive; neutral.	10 to 51 inches; brownish yellow extermely gravelly sandy clay loam; massive; neutral.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.
Substratum	32 inches; lake sediments.		Stratified alluvium.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	18 to 26	10 to 30
Available Water Capacity Class	Low	Very low to low	Variable
AWC for top 20”	2.5-3.1	1.8-2.3	
Permeability: Subsoil Substratum	Slow Slow	Rapid over slow Rapid	Variable Slow and very slow
Drainage Class	Well drained	Well drained	Very poorly drained
Max Erosion Hazard	Moderate	Moderate	High
Seedling Mortality	Slight	Moderate	Severe
Revegetating Exposed Subsoil	Slight	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 190 to 250	 Not capable 120 to 190	 Not capable 1,040 to 2,670
Soil Manageability Group Class	 III 3eX	 III 2p	 III 4EW

Inclusions: Included in this unit are small areas of Borolls and Kyburz soils. Included areas make up about 25 percent of the total area.

Management Considerations: Short growing season. Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and they have very low subsoil strength when wet. The subsoil tends to perch water during spring and the soils reach field capacity rapidly and can produce surface runoff. Martis Variant soils are moderately deep, have a dense subsoil which restricts roots, are susceptible to puddling in the spring, have high amounts of rock fragments, and have a coarse textured surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling in the spring, have high amounts of rock fragments, and have a coarse textured surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

CRE Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 25 to 30 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit Components	Aldi Variant	Kyburz	Jorge Variant
Proportion (percent)	50	20	20
Soil Profile Description			
Surface Layer	0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid.
Subsoil	8 to 32 inches; brown clay; massive; neutral.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	11 to 35 inches; brown very gravelly loam; massive; slightly acid.
Substratum	32 inches; lake sediments.	34 inches; weathered andesitic rock.	35 inches; highly weathered sediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	20 to 40
Available Water Capacity Class	Low	Low	Low
AWC for top 20”	2.5-3.1	2.2-2.7	1.7-2.3
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Moderate	Moderate Moderately rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 190 to 250	 5 P 120 to 190	 5,6 P 120 to 190
Soil Manageability Group Class	 III 3eX	 III 2ep	 III 2ep

Inclusions: Included in this unit are small areas of Aquolls, deep clay soils, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and they have very low subsoil strength when wet. The subsoil tends to perch water during spring and the soils reach field capacity rapidly and can produce surface runoff. Jorge Variant soils are moderately deep and have high amounts of rock fragments.

CRF Aldi Variant-Kyburz-Jorge Variant complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit Components	Aldi Variant	Kyburz	Jorge Variant
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid.
Subsoil	8 to 32 inches; brown clay; massive; neutral.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	11 to 35 inches; brown very gravelly loam; massive; slightly acid.
Substratum	32 inches; lake sediments.	34 inches; weathered andesitic rock.	35 inches; highly weathered sediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	20 to 40
Available Water Capacity Class	Low	Low	Low
AWC for top 20”	2.5-3.1	2.2-2.7	1.7-2.3
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Moderate	Moderate Moderately rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Moderate	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 190 to 250	 5 P 120 to 190	 5,6 P 120 to 190
Soil Manageability Group Class	 IV 4EX	 IV 3Ep	 IV 3Ep

Inclusions: Included in this unit are small areas of soils without argillic horizons and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and they have very low subsoil strength when wet. The subsoil tends to perch water during spring and the soils reach field capacity rapidly and can produce surface runoff. Jorge Variant soils have high amounts of rock fragments.

CSE Crozier-Cohasset complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Mixed conifer series	
Soil Map Unit Components	**Crozier**	**Cohasset**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 15 inches; brown loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	38 inches; weathered andesitic tuff breccia.	61 inches; andesitic conglomerate.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Moderate to high
AWC for top 20”	2.6-3.4	2.6-3.4
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 DF, P 50 to 440	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 II 2e	 II 2e
Inclusions	Included in this unit are small areas of McCarthy and Aiken soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Crozier soils are moderately deep..	

CSE5 Crozier-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Plantations.	
Soil Map Unit Components	**Crozier, altered**	**Cohasset, altered**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 3 inches; brown loam; massive; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.	12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.
Substratum	38 inches; weathered tuff breccia.	65 inches; weathered mudflow.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	40 to 86
Available Water Capacity Class	Low to moderate	Low to moderate
AWC for top 20”	2.6-3.3	2.8-3.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e
Inclusions	Included in this unit are small areas of McCarthy and Aiken soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Soils in this map unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Crozier soils are moderately deep..	

CSF Crozier-Cohasset complex, 30 to 50 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series	
Soil Map Unit Components	**Crozier**	**Cohasset**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 15 inches; brown loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	38 inches; weathered andesitic tuff breccia.	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Moderate to high
AWC for top 20”	2.6-3.4	2.6-3.4
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 DF, P 50 to 440	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 III 3e	 III 3e
Inclusions	Included in this unit are small areas of Aiken, Mariposa, and McCarthy soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. Crozier soils are moderately deep..	

CSF6 Crozier-Cohasset complex, 30 to 50 percent slopes, terraced

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation	Plantations	
Soil Map Unit Components	**Crozier**	**Cohasset**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 6 inches; strong brown loam; moderate granular structure; slightly acid.	0 to 8 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil	6 to 38 inches; red clay loam; weak subangular blocky structure; medium acid.	8 to 42 inches; reddish brown clay loam; weak subangular blocky structure; medium acid.
Substratum	38 inches; weathered tuff breccia.	42 inches; weathered mudflow.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Low to moderate
AWC for top 20”	3.1-3.6	2.7-3.3
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e
Inclusions	Included in this unit are small areas of McCarthy and Aiken soils on mudflow material and Hurlbut and Jocal soils on metasedimentary material; Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. These areas have been terraced. On-site investigations are necessary to determine if corrective treatment is needed. Crozier soils are moderately deep..	

CTE Crosier-McCarthy-Cohasset complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.		
Soil Map Unit Components	**Crozier**	**McCarthy**	**Cohasset**
Proportion (percent)	55	25	10
Soil Profile Description			
Surface Layer	0 to 15 inches; brown loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	38 inches; weathered andesitic tuff breccia.	28 inches; weathered andesitic tuff breccia.	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Low	Moderate to high
AWC for top 20”	2.6-3.4	2.3-2.6	2.6-3.4
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately rapid Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	Moderate
Seedling Mortality	Slight	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 DF, P 50 to 440	 4 DF, P 120 to 170	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 II 2e	 II 2ep	 II 2e
Inclusions	Included in this unit are small areas of Aiken and Ledmount soils; Rock outcrop; Cryumbrepts, wet near Fir Cap and Deadwood Peak; and soils similar to Crozier but with umbric epipedons. Included areas make up about 10 percent of the total area.		
Management Considerations	Crozier soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments.		

CTE5 Crosier-McCarthy-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Plantations.		
Soil Map Unit Components	**Crozier**	**McCarthy**	**Cohasset**
Proportion (percent)	55	25	10
Soil Profile Description			
Surface Layer	0 to 3 inches; brown loam; massive; slightly acid.	0 to 10 inches; brown gravelly sandy loam; moderate granular structure; neutral.	0 to 12 inches; brown loam; massive; neutral.
Subsoil	3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.	10 to 28 inches; brown very cobbly loam; weak subangular blocky structure; neutral.	12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.
Substratum	38 inches; weathered tuff breccia.	28 inches; weathered tuff breccia.	65 inches; weathered mudflow.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Low	Low to moderate
AWC for top 20”	2.6-3.3	2.6-3.0	2.8-3.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately rapid Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	Moderate
Seedling Mortality	Slight	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4E	 IV 4Ep	 IV 4E
Inclusions	Included in this unit are small areas of Aiken and Ledmount soils and Rock outcrop; Included areas make up about 10 percent of the total area.		
Management Considerations	Soils in this map unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Crozier soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments.		

CTG Crozier-McCarthy-Cohasset complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Mixed conifer-Black oak series.

Soil Map Unit Components	Crozier	McCarthy	Cohasset
Proportion (percent)	50	25	10
Soil Profile Description			
Surface Layer	0 to 15 inches; brown loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium.	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	38 inches; weathered andesitic tuff breccia.	28 inches; weathered andesitic tuff breccia.	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Low	Moderate to high
AWC for top 20”	2.6-3.4	2.3-2.6	2.3-2.6
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately rapid Moderately slow	Moderately slow Slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 DF, P 50 to 440	 3,4 DF, P 120 to 170	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 IV 4E	 IV 4Ep	 IV 4E

Inclusions: Included in this unit are small areas of Aiken and Ledmount soils; Rock outcrop; and soils similar to Cohasset but with umbric epipedons. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Crozier soils are moderately deep. McCarthy soils are moderately deep and have high amounts of rock fragments.

CUG Crosier-Mariposa-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Plantations.

Soil Map Unit Components	Crozier	Mariposa	Cryumbrepts, wet
Proportion (percent)	35	25	15
Soil Profile Description			
Surface Layer	0 to 15 inches; brown loam; moderate granular structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; neutral.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.	
Substratum	38 inches; weathered andesitic tuff breccia.	33 inches; hard and semi-hard metasediments.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	15 to 33	Variable
Available Water Capacity Class	Low to moderate	Low	Very low
AWC for top 20”	2.6-3.4	2.2-2.8	
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Slight	Moderate to slight	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 DF, P 50 to 440	 3,4 DF, P 120 to 170	 Not capable 170 to 640
Soil Manageability Group Class	 III 3E	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Hurlbut, Jocal, and Josephine Variant soils; soils similar to Cohasset but with umbric epipedons; and very gravelly colluvial soils without argillic horizons. Included areas make up about 25 percent of the total area.

Management Considerations: Steep and very steep slopes. Crozier soils are moderately deep. Mariposa soils are shallow or moderately deep, have thin surface layers, and reach field capacity rapidly, which can produce surface runoff. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

CYD Cryumbrepts, wet, 2 to 15 percent slopes

Elevation: 3,800 to 8,000 feet Annual Precipitation: 30 to 70 inches

Typical Vegetation	Alder series; Meadow/Willow series.
Soil Map Unit Components	**Cryumbrepts, wet**
Proportion (percent)	85

Soil Profile Description

Surface Layer	Thick and dark colored; stratified sandy loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	
Substratum	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	Variable
Available Water Capacity Class	Very low
AWC for top 20”	
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Poorly drained
Max Erosion Hazard	Very high
Seedling Mortality	Severe
Revegetating Exposed Subsoil	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EW
Inclusions	Included in this unit are small areas of moderately well drained soils; soils with histic epipedons; and soils with a mesic or frigid temperature regime. Included areas make up about 15 percent of the total area.
Management Considerations	These soils have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

DDH Rock outcrop-Deadwood association, 50 to 100 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 40 to 65 inches

Typical Vegetation	Barren-Live oak series.	
Soil Map Unit Components	**Rock outcrop**	**Deadwood**
Proportion (percent)	50	35
Soil Profile Description		
Surface Layer	Hard metamorphic rock.	0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid.
Subsoil		3 to 13 inches; light yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum		13 inches; hard metasedimentary rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)		10 to 20
Available Water Capacity Class		Very low
AWC for top 20”		0.4-0.7
Permeability: Subsoil Substratum		Moderately rapid Slow
Drainage Class		Somewhat excessively drained
Max Erosion Hazard		High
Seedling Mortality		Severe
Revegetating Exposed Subsoil		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 Not capable 20 to 80
Soil Manageability Group Class		 IV 4EP
Inclusions	Included in this unit are small areas of Hurlbut soils and colluvial soils with a wide range in characteristics. Included areas make up about 15 percent of the total area.	
Management Considerations	Very steep slopes. Deadwood soils are shallow to hard bedrock, have coarse textures, and a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.	

DEG Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 65 inches

Typical Vegetation	Live oak series; Mixed conifer series.		
Soil Map Unit Components	**Deadwood**	**Rock outcrop**	**Hurlbut**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid.	Metasedimentary rock.	0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky and granular structure; medium acid.
Subsoil	3 to 13 inches; light yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; medium acid.		4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid.
Substratum	13 inches; hard metasedimentary rock.		27 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	10 to 20		20 to 40
Available Water Capacity Class	Very low		Very low to low
AWC for top 20”	0.4-0.7		2.6-3.4
Permeability: Subsoil Substratum	Moderately rapid Slow		Moderately slow Slow
Drainage Class	Somewhat excessively drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Severe		Moderate to slight
Revegetating Exposed Subsoil	Severe		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 20 to 80		 5,6 P, DF 20 to 120
Soil Manageability Group Class	 IV 4EP		 IV 3Ep
Inclusions	Included in this unit are small areas of soils similar to Hurlbut but with more than 35 prcent rock fragments; soils similar to Jocal but with more than 35 percent rock fragments; and very gravelly colluvial soils without argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Deadwood soils are shallow to hard bedrock, have coarse textures, and a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Hurlbut soils are moderately deep and have thin surface layers. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.		

DLE Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes

Elevation: 4,800 to 5,400 feet Annual Precipitation: 15 to 26 inches

Typical Vegetation	Sagebrush/Bitterbrush-Mixed conifer series.		
Soil Map Unit Components	**Delleker**	**Kyburz**	**Trojan**
Proportion (percent)	50	20	20
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown sandy loam; moderate platy structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.
Subsoil	12 to 46 inches; light brown clay sandy clay loam; moderate subangular blocky structure; medium acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strong acid.	10 to 67 inches; rown and light brown clay loam; moderate angular blocky structure; medium acid.
Substratum	46 to 50 inches; very pale brown loam; massive; medium acid.	34 inches; weathered andesitic rock.	67 inches; slightly fractured andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 70	20 to 40	40 to 80
Available Water Capacity Class	Low to moderate	Low	Low to moderate
AWC for top 20”	2.2-2.9	2.2-2.7	1.8-2.5
Permeability: Subsoil Substratum	Moderate Moderate	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, WF 120 to 190	 5,6 P,WF 120 to 190	 4,5 P, WF 190 to 250
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Sattley soils; soils similar to Delleker, Kyburz, and Trojan but with thinner A horizons; and similar soils with a coarse-loamy argillic horizon. Included areas make up about 10 percent of the total area.		
Management Considerations	Relatively short growing season. Delleker soils have thin surface layers. Kyburz soils are moderately deep and have thin surface layers.		

DUE Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation: California bay-Mixed brush series.

Soil Map Unit Components	Dubakella	Dubakella Variant	Rock outcrop
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.	0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid.	Serpentinitic rock.
Subsoil	3 to 32 inches; yellowish red very cobbly clay loam; massive; mildly alkaline.	5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral.	
Substratum	32 inches; serpentinitic bedrock.	13 inches; fractured serpentinitic rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	
Available Water Capacity Class	Low	Low	
AWC for top 20”	2.3-2.6	2.3-2.6	
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Very slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate	Severe	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 70 to 120	 Not capable 20 to 80	
Soil Manageability Group Class	 II 2ep	 II 2ep	

Inclusions: Included in this unit are small areas of Forbes soils; soils similar Dubakella with loamy-skeletal subsoils; soils similar to Dubakella but wih fine-loamy textures in the subsoil which are redder; and soils similar to Dubakella but with hard rock contacts above 20 inches. Included areas make up about 25 percent of the total area.

Management Considerations: Low ferility due to the serpentinitic nature of the parent material. Dubakella soils have thin surface layers, are moderately deep, have a high amount of rock fragments, and have low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, have a thin surface layer, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.

DUF Dubakella-Dubakella Variant-Rock outcrop complex, 30 to 50 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation: California bay-Mixed brush series.

Soil Map Unit Components	Dubakella	Dubakella Variant	Rock outcrop
Proportion (percent)	40	15	20
Soil Profile Description			
Surface Layer	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.	0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid.	Serpentinitic rock.
Subsoil	3 to 32 inches; yellowish red very cobbly clay loam; masive; mildly alkaline.	5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral.	
Substratum	32 inches; serpentinitic bedrock.	13 inches; fractured serpentinitic rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	
Available Water Capacity Class	Low	Low	
AWC for top 20”	2.3-2.6	1.3-1.6	
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Very slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate	Severe	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 70 to 120	 Not capable 20 to 80	
Soil Manageability Group Class	 III 3Ep	 III 3Ep	

Inclusions: Included in this unit are small areas of Forbes soils; soils similar Dubakella with loamy-skeletal subsoils; soils similar to Dubakella but wih fine-loamy textures in the subsoil; soils similar to Dubakella which have mollic epipedons and are ruptic-lithic; and soils similar to Forbes but with more than 35 percent rock fragments. Included areas make up about 25 percent of the total area.

Management Considerations: Steep slopes. Low ferility due to the serpentinitic nature of the parent material. Dubakella soils have thin surface layers, are moderately deep, have a high amount of rock fragments, and have low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, have a thin surface layer, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.

ETE Euer-Aquolls-Martis Variant complex, 2 to 30 percent slopes

Elevation: 5,000 to 6,500 feet Annual Precipitation: 25 to 30 inches

Typical Vegetation: Jeffrey/Pondrosa-Sagebrush/Bitterbrush series.

Soil Map Unit Components	Euer	Aquolls	Martis Variant
Proportion (percent)	50	15	15
Soil Profile Description			
Surface Layer	0 to 15 inches; brown sandy loam; moderate granular structure; slightly acid.	Thick and dark colored; stratified coarse sand to clay.	0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.
Subsoil	15 to 47 inches; yellowish brown very gravelly sandy clay loam; massive; slightly acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.	10 to 51 inches; brownish yllow exteremely gravelly sandy clay loam; massive; neutral.
Substratum	47 to 65 inches; brownish yellow extremely gravelly sandy loam; massive; medium acid.	Stratified alluvium.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	10 to 30	18 to 26
Available Water Capacity Class	Very low to low	Variable	Very low to low
AWC for top 20”	2.0-2.5		1.8-2.3
Permeability: Subsoil Substratum	Moderate Rapid	Variable Slow and very slow	Rapid over slow Rapid
Drainage Class	Well drained	Very poorly drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate to slight	Severe	Moderate
Revegetating Exposed Subsoil	Slight	Severe	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6,5 P 120 to 190	 Not capable 1,040 to 2,670	 Not capable 120 to 190
Soil Manageability Group Class	 II 2ep	 II 4EW	 II 2ep

Inclusions: Included in this unit are small areas of Aldi Variant, Borolls, Kyburz, and Martis soils, and areas where slopes are 30 to 50 percent. Included areas make up about 20 percent of the total area.

Management Considerations: Short growing season. Euer soils have a high amount of rock fragments. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer. Aquolls have a high water tble during most of the year, are susceptible to puddling, and are subject to flooding.

EUB Euer-Martis Variant complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series; Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.	
Soil Map Unit Components	**Euer**	**Martis Variant**
Proportion (percent)	55	35
Soil Profile Description		
Surface Layer	0 to 15 inches; brown sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.
Subsoil	15 to 47 inches; yellowish brown very gravelly sandy clay loam; massive; slightly acid.	10 to 51 inches; brownish yellow extermely gravelly sandy clay loam; massive; neutral.
Substratum	47 to 65 inches; brownish yellow extremely gravelly sandy loam; massive; medium acid.	
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	18 to 26
Available Water Capacity Class	Very low to low	Very low to low
AWC for top 20”	2.0-2.5	1.8-2.3
Permeability: Subsoil Substratum	Moderate Rapid	Rapid over slow Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Moderate or slight	Moderate
Revegetating Exposed Subsoil	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6,5 P 120 to 190	 Not capable 120 to 190
Soil Manageability Group Class	 II 2p	 II 2p
Inclusions	Included in this unit are small areas of Kyburz and Martis soils; Included areas make up about 10 percent of the total area.	
Management Considerations	Short growing season. Euer soils have a high amount of rock fragments. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer.	

EUE Euer-Martis Variant complex, 5 to 30 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Euer**	**Martis Variant**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 15 inches; brown sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.
Subsoil	15 to 47 inches; yellowish brown very gravelly sandy clay loam; massive; slightly acid.	10 to 51 inches; brownish yellow extermely gravelly sandy clay loam; massive; neutral.
Substratum	47 to 65 inches; brownish yellow extremely gravelly sandy loam; massive; medium acid.	
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	18 to 26
Available Water Capacity Class	Very low to low	Very low to low
AWC for top 20”	2.0-2.5	1.8-2.3
Permeability: Subsoil Substratum	Moderate Rapid	Rapid over slow Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate or slight	Moderate
Revegetating Exposed Subsoil	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6,5 P 120 to 190	 Not capable 120 to 190
Soil Manageability Group Class	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Kyburz and Martis soils, and areas where slopes are 30 to 50 percent. Included areas make up about 10 percent of the total area.	
Management Considerations	Short growing season. Euer soils have a high amount of rock fragments. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock frgments, and have a coarse textured surface layer.	

EVB Inville-Martis Variant complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation	Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Inville**	**Martis Variant**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 6 inches; grayish brown cobbly coarse sandy loam; weak granular structure; strongly acid.	0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.
Subsoil	6 to 30 inches; yellowish brown very cobbly coarse sandy loam; weak subangular blocky structure; medium acid.	10 to 51 inches; brownish yellow extermely gravelly sandy clay loam; massive; neutral.
Substratum	30 to 60 inches; yellowish brown extremely cobbly coarse sandy loam; weak subangular blocky structure; medium acid.	
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	30 to 40	18 to 26
Available Water Capacity Class	Very low	Very low to low
AWC for top 20”	0.9-1.4	1.8-2.3
Permeability: Subsoil Substratum	Moderately rapid Rapid	Rapid over slow Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Severe to moderate	Moderate
Revegetating Exposed Subsoil	Moderate	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 120	 Not capable 120 to 190
Soil Manageability Group Class	 III 3pX	 III 2p
Inclusions	Included in this unit are small areas of Euer soils, riverwash, and soils without argillic horizons. ;Included areas make up about 10 percent of the total area.	
Management Considerations	Short growing season. Inville soils are moderately deep, have coarse textures, have high amounts of rock fragments, and have a thin suface layer. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer.	

EWB Inville-Riverwash-Aquolls complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation	Sagebrush/Bitterbrush-Meadow/Willow series.		
Soil Map Unit Components	**Inville**	**Riverwash**	**Aquolls**
Proportion (percent)	55	20	15
	Soil Profile Description		
Surface Layer	0 to 6 inches; grayish brown cobbly coarse sandy loam; weak granular structure; strongly acid.	Stony, cobbly, gravelly fluvial material along streams and waterways.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	6 to 30 inches; yellowish brown very cobbly coarse sandy loam; weak subangular blocky structure; medium acid.		Stratified layers with mottles; sandy loam to clay; some are very gravelly.
Substratum	30 to 60 inches; yellowish brown extremely cobbly coarse sandy loam; weak subangular blocky structure; medium acid.		Stratified alluvium.
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	30 to 40		20 to 40
Available Water Capacity Class	Very low		Low
AWC for top 20”	0.9-1.4		2.3-2.6
Permeability: Subsoil Substratum	Moderately rapid Rapid		Variable Slow and very slow
Drainage Class	Well drained		Very poorly drained
Max Erosion Hazard	Moderate		High
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 120		 Not capable 1,040 to 2,670
Soil Manageability Group Class	 IV 4EpX		 IV 4EW
Inclusions	Included in this unit are small areas of Borolls and soils without argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Inville soils are moderately deep, have coarse textures, have high amounts of rock fragments, and have a thin surface layer. The substratum is a potential gravel source. Riverwash areas are a potential aggregate source and are subject to flooding. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.		

EXE Lorack Variant gravelly loam, 2 to 30 percent slopes

Elevation: 5,500 to 6,500 feet Annual Precipitation: 30 to 45 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.
Soil Map Unit Components	**Lorack Variant gravelly loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 7 inches; brown gravelly loam; weak granular structure; neutral.
Subsoil	7 to 25 inches; dark brown very gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	25 to 36 inches; brown extremely gravelly sandy loam; massive; slightly acid; over weakly cemented till.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	33 to 40
Available Water Capacity Class	Very low to low
AWC for top 20”	2.1-2.5
Permeability: Subsoil Substratum	Moderately slow Very slow
Drainage Class	Moderately well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P,WF 50 to 240
Soil Manageability Group Class	 II 2ep
Inclusions	Included in this unit are small areas of Tallac and Waca soils, and similar soils with umbric epipedons. Included areas make up about 15 percent of the total area.
Management Considerations	These soils are moderately deep and have a high amount of rock fragments.

FFE Ponto Variant-Neer complex, 2 to 30 percent slopes

Elevation: 3,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Mixed brush series.	
Soil Map Unit Components	**Ponto Variant**	**Neer**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 7 inches; gray sandy loam; massive; neutral.	0 to 6 inches; pale brown extremely gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	7 to 22 inches; gray fine sandy loam; moderate angular blocky structure; slightly acid.	6 to 29 inches; very pale brown extermely gravelly sandy loam; massive; medium acid.
Substratum	22 inches; highly weathered rhyolitic tuff.	29 inches; weathered rhyolitic tuff.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Very low
AWC for top 20”	3.0-3.4	0.6-0.7
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Slight	Severe
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 WF, P 50 to 240	 5,4 WF P 70 to 170
Soil Manageability Group Class	 II 2e	 II 3ep
Inclusions	Included in this unit are small areas of Ahart, Crozier, and McCarthy soils and Hotaw rhyolitic substratum soils in the area of Scott’s Flat reservoir. Included areas make up about 15 percent of the total area.	
Management Considerations	Ponto Variant soils are moderately deep and have a thin surface layer. Neer soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer.	

FFF Ponto Variant-Neer complex, 30 to 50 percent slopes

Elevation: 3,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Mixed brush series.	
Soil Map Unit Components	**Ponto Variant**	**Neer**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 7 inches; gray sandy loam; massive; neutral.	0 to 6 inches; pale brown extremely gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	7 to 22 inches; gray fine sandy loam; moderate angular blocky structure; slightly acid.	6 to 29 inches; very pale brown extermely gravelly sandy loam; massive; medium acid.
Substratum	22 inches; highly weathered rhyolitic tuff.	29 inches; weathered rhyolitic tuff.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Very low
AWC for top 20”	3.0-3.4	0.6-0.7
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Severe
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 WF, P 50 to 240	 4 P 70 to 170
Soil Manageability Group Class	 III 3E	 III 4EP
Inclusions	Included in this unit are small areas of Ahart, Crozier, and McCarthy soils; Hotaw rhyolitic substratum soils in the area of Scott’s Flat reservoir; soils similar to Neer but with hard rock at a depth of less than 20 inches; and Rock outcrop. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. Ponto Variant soils are moderately deep and have a thin surface layer. Neer soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer.	

FGG3 Ponto Variant-Neer-Rock outcrop complex, 30 to 75 percent slopes, severely eroded

	Elevation: 3,000 to 6,000 feet	Annual Precipitation: 50 to 70 inches	
Typical Vegetation	Mixed brush-Mixed conifer series.		
Soil Map Unit Components	**Ponto Variant, severely eroded**	**Neer, severely eroded**	**Rock outcrop**
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 3 inches; light brownish gray sandy loam; weak granular structure; slightly acid.	0 to 3 inches; light brownish gray extremely gravelly sandy loam; moderate granular structure; slightly acid.	Rhyolitic rock.
Subsoil	3 to 25 inches; light gray sandy loam; weak subangular blocky structure; medium acid.	3 to 24 inches; pale brown extremely gravelly sandy loam; massive; medium acid.	
Substratum	25 inches; weathered rhyolitic tuff.	24 inches; weathered rhyolitic tuff.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	30 to 40	20 to 40	
Available Water Capacity Class	Low	Very low	
AWC for top 20”	2.6-3.0	1.4-1.6	
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Moderately slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Slight	Severe	
Revegetating Exposed Subsoil	Moderate	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	
Soil Manageability Group Class	 IV 4E	 IV 4EP	
Inclusions	Included in this unit are small areas of Ahart and McCarthy soils; similar soils which are less than 20 inches deep. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Ponto Variant soils are moderately deep and a thin surface layer. Neer soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer. Rock outcrop areas are a potential source of aggregate. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.		

FJG2 Fugawee-Jorge-Rubble land complex, 30 to 75 percent slopes, eroded

Elevation: 6,000 to 7,500 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Ceanothus-Jeffrey/Ponderosa series.		
Soil Map Unit Components	**Fugawee, eroded**	**Jorge, eroded**	**Rubble land**
Proportion (percent)	40	30	20
Soil Profile Description			
Surface Layer	0 to 4 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 10 inches; dark grayish brown gravelly loam; weak granular structure; neutral.	Angular stones and cobbles with some soil material between rock fragments.
Subsoil	4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid.	10 to 41 inches; brown cobbly clay loam; weak subangular blocky structure; medium acid.	
Substratum	35 inches; weathered volcanic rock (andesitic flow or tuff breccia).	41 inches; weathered volcanic rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	40 to 60	
Available Water Capacity Class	Low	Very low	
AWC for top 20”	2.4-3.0		
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow	Moderate Moderate	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Slight	Moderate	
Revegetating Exposed Subsoil	Slight	Slight	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P Not rated	 5 P Not rated	
Soil Manageability Group Class	 IV 4Ep	 IV 3ep	
Inclusions	Included in this unit are small areas of Rock outcrop and soils similar to Kyburz but the subsoil has more than 35 percent rock fragments. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Fugawee soils have a moderate soil depth and a thin surface layer. Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential aggregate source and have a potential for raveling.		

FME Fugawee sandy loam, 2 to 30 percent slopes

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.
Soil Map Unit Components	**Fugawee sandy loam**
Proportion (percent)	90

Soil Profile Description

Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.
Substratum	35 inches; weathered andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.1-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 70 to 120
Soil Manageability Group Class	 II 2ep
Inclusions	Included in this unit are small areas of Tahoma soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.
Management Considerations	These soils are moderately deep and have a thin surface layer.

FME5 Fugawee sandy loam, 2 to 30 percent slopes, altered

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Plantations.
Soil Map Unit Components	**Fugawee sandy loam, altered**
Proportion (percent)	90

Soil Profile Description

Surface Layer	0 to 4 inches; brown sandy loam; moderate granular structure; slightly acid.
Subsoil	4 to 25 inches; strong brown clay loam; moderate subangular blocky structure; medium acid.
Substratum	25 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.1-3.3
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.
Management Considerations	These soils are moderately deep and have a thin surface layer.

FMF Fugawee sandy loam, 30 to 50 percent slopes

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series; Mixed conifer-Sagebrush series.
Soil Map Unit Components	**Fugawee sandy loam**
Proportion (percent)	90

Soil Profile Description

Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.
Substratum	35 inches; weathered andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.1-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 70 to 120
Soil Manageability Group Class	 IV 4Ep
Inclusions	Included in this unit are small areas of Tahoma soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.
Management Considerations	Steep slopes. These soils are moderately deep and have a thin surface layer.

FMF2 Fugawee sandy loam, 30 to 50 percent slopes, eroded

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series; Mixed conifer-Sagebrush series.
Soil Map Unit Components	**Fugawee sandy loam, eroded**
Proportion (percent)	90

Soil Profile Description

Surface Layer	0 to 4 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil	4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid.
Substratum	35 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.4-3.0
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P Not rated
Soil Manageability Group Class	 IV 4Ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.
Management Considerations	Steep slopes. These soils are moderately deep and have a thin surface layer.

FRE Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation	Mixed conifer-Barren series.		
Soil Map Unit Components	**Fugawee**	**Rock outcrop**	**Tahoma**
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	Weathered volcanic rock.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.		8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	35 inches; weathered andesite.		41 inches; highly weathered andesitic tuff.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 60
Available Water Capacity Class	Low		Low
AWC for top 20”	2.1-2.7		2.3-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 20 to 120		 4,5 P, WF 70 to 170
Soil Manageability Group Class	 II 2ep		 II 2ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff can increase erosion on adjacent soils.		

FRE5 Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes, altered

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Plantations.		
Soil Map Unit Components	**Fugawee, altered**	**Rock outcrop**	**Tahoma, altered**
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 4 inches; brown sandy loam; moderate granular structure; slightly acid.	Weathered volcanic rock.	0 to 5 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	4 to 25 inches; strong brown clay loam; moderate subangular blocky structure; medium acid.		5 to 41 inches; brown clay loam; weak subangular blocky structure; medium acid.
Substratum	25 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).		41 inches; weathered volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 60
Available Water Capacity Class	Low		Low
AWC for top 20”	2.1-3.3		2.6-3.3
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated		 Not rated Not rated
Soil Manageability Group Class	 IV 4ep		 IV 4ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 15 percent of the total area.		
Management Considerations	Surface layers have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff from Rock outcrop can increase erosion on adjacent soils.		

FRF Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation	Mixed conifer-Barren series.		
Soil Map Unit Components	**Fugawee**	**Rock outcrop**	**Tahoma**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	Volcanic rock.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.		8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	35 inches; weathered andesite.		41 inches; highly weathered andesitic tuff.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 60
Available Water Capacity Class	Low		Low
AWC for top 20”	2.1-2.7		2.3-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 20 to 120		 4,5 P, WF 70 to 170
Soil Manageability Group Class	 III 3ep		 III 3ep
Inclusions	Included in this unit are small areas of Jorge soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.		

FRF2 Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, eroded

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Ceanothus-Mixed conifer series.		
Soil Map Unit Components	**Fugawee, eroded**	**Rock outcrop**	**Tahoma, eroded**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 4 inches; brown sandy loam; weak granular structure; slightly acid.	Volcanic rock.	0 to 5 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid.		5 to 41 inches; brown clay loam; weak subangular blocky structure; medium acid.
Substratum	35 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).		41 inches; weathered volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 60
Available Water Capacity Class	Low		Low
AWC for top 20”	2.4-3.0		2.6-3.3
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P Not rated		 5 P, WF Not rated
Soil Manageability Group Class	 IV 4Ep		 IV 4Ep
Inclusions	Included in this unit are small areas of Jorge soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Surface layers have been eroded. On-site investigations are needed to determine if corrective treatments are needed. Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff from Rock outcrop can increase erosion on adjacent soils.		

FRF6 Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, terraced

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation	Plantations.		
Soil Map Unit Components	**Fugawee, terraced**	**Rock outcrop**	**Tahoma, terraced**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 5 inches; dark yellowish brown sandy loam; weak granular structure; slightly acid.	Volcanic rock.	0 to 4 inches; brown gravelly loam; massive; slightly acid.
Subsoil	5 to 34 inches; yellowish brown clay loam; moderate subangular blocky structure; medium acid.		4 to 42 inches; pale brown gravelly clay loam; massive; strongly acid.
Substratum	34 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).		42 inches; weathered volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 60
Available Water Capacity Class	Low		Low
AWC for top 20”	2.2-2.9		2.2-2.8
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated		 Not rated Not rated
Soil Manageability Group Class	 IV 4Ep		 IV 4Ep
Inclusions	Included in this unit are small areas of Jorge soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. These areas have been terraced. On-site investigations are necessary to determine if corrective treatments are needed. Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.		

FTE Fugawee-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Fugawee**	**Tahoma**
Proportion (percent)	50	40

Soil Profile Description

Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	35 inches; weathered andesite.	41 inches; highly weathered andesitic tuff.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 60
Available Water Capacity Class	Low	Low
AWC for top 20”	2.1-2.7	2.3-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180	 3 RF, WF 140 to 180
Soil Manageability Group Class	 II 2ep	 II 2ep

Inclusions

Included in this unit are small areas of Jorge, Kyburz, and Waca soils, and similar soils with umbric epipedons. Included areas make up about 10 percent of the total area.

Management Considerations

Fugawee soils are moderately deep and have a thin surface layer.

FTF Fugawee-Tahoma complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Fugawee**	**Tahoma**
Proportion (percent)	50	40

Soil Profile Description

Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	35 inches; weathered andesite.	41 inches; highly weathered andesitic tuff.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 60
Available Water Capacity Class	Low	Low
AWC for top 20”	2.1-2.7	2.3-2.7
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180	 3 RF, WF 140 to 180
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Jorge, Kyburz, and Waca soils, and soils with thick, dark surface horizons. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. Fugawee soils are moderately deep and have a thin surface layer.	

FUC Kyburz-Trojan-Sierraville complex, 2 to 9 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation: Ceanothus-Jeffrey/Ponderosa series.

Soil Map Unit Components	Kyburz	Trojan	Sierraville
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strong acid.	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.	9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid.
Substratum	34 inches; weathered andesitic rock.	67 inches; slightly fractured andesite.	75 inches; slightly weathered andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	40 to 80	40 to 80
Available Water Capacity Class	Low	Low to moderate	Low to high
AWC for top 20”	2.2-2.7	1.8-2.5	2.4-2.8
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	Moderate	Moderate	Moderate
Seedling Mortality	Slight	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 4,5 P 190 to 250	 4,5 P 120 to 190
Soil Manageability Group Class	 II 2p	 II 2p	 II 1

Inclusions: Included in this unit are small areas of deep very gravelly alluvial soils. Included areas make up about 15 percent of the total area.

Management Considerations: Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Sierraville soils have stones in the surface layer and a subsoil with low strength when wet.

FUE Kyburz-Trojan complex, 9 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.	
Soil Map Unit Components	**Kyburz**	**Trojan**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.
Substratum	34 inches; weathered andesitic rock.	67 inches; slightly fractured andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low	Low to moderate
AWC for top 20”	2.2-2.7	1.8-2.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190	 4,5 P, WF 190 to 250
Soil Manageability Group Class	 II 2ep	 II 2ep

Inclusions

Included in this unit are small areas of Aldi and Sierraville soils; soils similar to Kyburz but with more than 35 percent rock fragments; shallow soils with fine-loamy argillic horizons; and areas with slopes of less than 9 percent. Included areas make up about 15 percent of the total area.

Management Considerations

Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer.

FUE5 Kyburz-Trojan complex, 2 to 30 percent slopes, altered

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.	
Soil Map Unit Components	**Kyburz, altered**	**Trojan, altered**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 5 inches; dark grayish brown sandy loam; moderate granular structure; slightly acid.	0 to 3 inches; dark grayish brown loam; massive; slightly acid.
Subsoil	5 to 27 inches; brown sandy clay loam; moderate subangular blocky structure; medium acid.	3 to 43 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; medium acid.
Substratum	27 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).	43 inches; weathered volcanic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low	Low to moderate
AWC for top 20”	2.6-3.1	2.7-3.2
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4ep
Inclusions	Included in this unit are small areas of Aldi and Sierraville soils, and shallow soils with fine-loamy argillic horizons. Included areas make up about 15 percent of the total area.	
Management Considerations	Relatively short growing season. Suface layers have been disturbed. On-site invetigations are needed to determine if corrective treatments are needed. Kyburz soils are moderately deep and have a thin surface layer.	

FUF Kyburz-Trojan complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.	
Soil Map Unit Components	**Kyburz**	**Trojan**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.
Substratum	34 inches; weathered andesitic rock.	67 inches; slightly fractured andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low	Low to moderate
AWC for top 20”	2.2-2.7	1.8-2.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190	 4,5 P, WF 190 to 250
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Aldi and Sattley soils; soils similar to Kyburz but with mollic epipedons; and shallow soils with fine-loamy argillic horizons. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes and a relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer.	

FUF6 Kyburz-Trojan complex, 30 to 50 percent slopes, terraced

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation	Plantations.	
Soil Map Unit Components	**Kyburz, terraced**	**Trojan, terraced**
Proportion (percent)	65	20

Soil Profile Description

Surface Layer	0 to 5 inches; dark brown sandy loam; weak granular structure; slightly acid.	0 to 3 inches; dark grayish brown loam; massive; slightly acid.
Subsoil	5 to 27 inches; brown clay loam; moderate subangular blocky structure; medium acid.	3 to 43 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; medium acid.
Substratum	27 inches; weathered volcanic rock	43 inches; weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 80
Available Water Capacity Class	Low	Low to moderate
AWC for top 20”	2.6-3.1	2.7-3.2
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4ep

Inclusions

Included in this unit are small areas of Aldi and Sierraville soils, and shallow soils with fine-loamy argillic horizons. Included areas make up about 15 percent of the total area.

Management Considerations

Relatively short growing season. Suface layers have been disturbed. On-site invetigations are needed to determine if corrective treatments are needed. Kyburz soils are moderately deep and have a thin surface layer.

FVE Fugawee-Tahoma-Aquolls complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation: Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Fugawee	Tahoma	Aquolls
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.	0 to 4 inches; brown gravelly loam; massive; slightly acid.
Subsoil	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.	4 to 42 inches; pale brown gravelly clay loam; massive; strongly acid.
Substratum	35 inches; weathered andesite.	41 inches; highly weathered andesitic tuff.	42 inches; weathered volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	40 to 60	10 to 30
Available Water Capacity Class	Low	Low	Variable
AWC for top 20”	2.2-2.9	2.2-2.8	
Permeability: Subsoil Substratum	Moderate to moderately slow Moderately slow	Moderately slow Moderately slow	Variable Slow to very slow
Drainage Class	Well drained	Well drained	Very poorly drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 20 to 120	 4,5 P, WF 70 to 170	 1,040 to 2,670
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Aldi, Borolls, Jorge, Kyburz, and Waca soils; and deep very gravelly alluvial soils. Included areas make up about 15 percent of the total area.

Management Considerations: Fugawee soils have a moderate soil depth and a thin surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

GBF Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes

	Elevation: 5,000 to 9,000 feet	Annual Precipitation: 50 to 70 inches	
Typical Vegetation	Mixed conifer-Alder/Willow series.		
Soil Map Unit Components	**Celio Variant**	**Rock outcrop**	**Cryumbrepts, wet**
Proportion (percent)	45	30	15
	Soil Profile Description		
Surface Layer	0 to 10 inches; dark grayish brown stony sandy loam; srtong granular structure; slightly acid or medium acid.	Granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	10 to 42 inches; pale brown very stony sandy loam; weak granular structure; medium acid.		
Substratum	42 to 61 inches; very pale brown very stony loamy coarse sand; massive; medium acid.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60		Variable
Available Water Capacity Class	Very low to low		Very low
AWC for top 20”	1.0-1.4		
Permeability: Subsoil Substratum	Rapid Slow		Moderately rapid Very slow
Drainage Class	Excessively drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EpX		 IV 4EW
Inclusions	Included in this unit are small areas of similar soils that are shallow or moderately deep. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Celio Variant soils have sandy textures, high amounts of rock fragments, and a low cation exchange capacity (CEC). Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential source of aggregate.		

GEC Gefo-Aquolls-Celio complex, 2 to 9 percent slopes

Elevation: 6,200 to 6,800 feet Annual Precipitation: 40 to 50 inches

Typical Vegetation: Lodgepole-Meadow/Willow series; Lodgepole-Alder/Willow series.

Soil Map Unit Components	Gefo	Aquolls	Celio
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 15 inches; grayish brown loamy sand; weak granular structure; medium acid.	Thick and dark colored; stratified coarse sand to clay.	0 to 12 inches; grayish brown gravelly sandy loam; weak granular structure; slightly acid.
Subsoil	15 to 40 inches; pale brown loamy fine sand; massive; medium acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.	12 to 40 inches; light yellowish brown extremely gravelly loamy coarse sand; medium acid to strongly acid.
Substratum	40 to 60 inches; pale brown loamy fine sand; massive; medium acid.	Stratified alluvium.	40 inches; extremely gravelly loamy coarse sand; weakly cemented with silica.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	10 to 30	40 to 60
Available Water Capacity Class	Low to moderate	Variable	Very low
AWC for top 20”	1.5-2.2		1.2-1.7
Permeability: Subsoil Substratum	Very rapid to rapid Very rapid	Variable Slow to very slow	Rapid Slow
Drainage Class	Somewhat excessively drained	Very poorly drained	Somewhat poorly drained
Max Erosion Hazard	Moderate	High	Moderate
Seedling Mortality	Moderate to slight	Severe	Severe to moderate
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 LP 60 to 100	 Not capable 1,040 to 2,670	 5 LP 60 to 100
Soil Manageability Group Class	 2p	 4EW	 2p

Inclusions: Included in this unit are small areas of Borolls and Tallac soils, and soils similar to Celio which are loamy-skeletal. Included areas make up about 10 percent of the total area.

Management Considerations: Gefo soils are sandy, have a seasonal water table, and have a low cation exchange capacity (CEC). Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Celio soils have sandy textures, high amounts of rock fragments, and a low cation exchange capacity (CEC). A cemented pan below 40 inches holds a fluctuating water table near the surface in the spring and early summer. Lodgepole pine is the adapted species.

GGF Celio Variant-Rock outcrop complex, 30 to 50 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Celio Variant**	**Rock outcrop**
Proportion (percent)	50	40

Soil Profile Description

Surface Layer	0 to 10 inches; dark grayish brown stony sandy loam; srtong granular structure; slightly acid or medium acid.	Granitic rock.
Subsoil	10 to 42 inches; pale brown very stony sandy loam; weak granular structure; medium acid.	
Substratum	42 to 61 inches; very pale brown very stony loamy coarse sand; massive; medium acid.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low to low
AWC for top 20”	1.0-1.4
Permeability: Subsoil Substratum	Rapid Slow
Drainage Class	Excessively drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140
Soil Manageability Group Class	 IV 4EPx
Inclusions	Included in this unit are small areas of Ledford and Ledford Variant soils, and similar soils that are shallow or moderately deep. Included areas make up about 10 percent of the total area.
Management Considerations	Steep slopes. Celio Variant soils have sandy textures, high amounts of rock fragments, and a low cation exchange capacity (CEC). Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

GID Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Grass series; Alder/Willow series; and Barren.	
Soil Map Unit Components	**Gefo Variant**	**Cryumbrepts, wet**
Proportion (percent)	70	15
Soil Profile Description		
Surface Layer	0 to 22 inches; grayish brown very fine sandy loam; strong granular structure; strongly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	22 to 43 inches; brown very fine sandy loam; weak subangular blocky structure; medium acid.	
Substratum	43 to 61 inches; light yellowish brown loam; common mottles; massive; strongly acid.	Startified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	Variable
Available Water Capacity Class	Low to high	Very low
AWC for top 20”	2.4-3.2	
Permeability: Subsoil Substratum	Moderately rapid Moderate	Moderately rapid Very slow
Drainage Class	Well drained	Poorly drained
Max Erosion Hazard	Moderate	Very high
Seedling Mortality	Slight	Severe
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated 170 to 640	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 4EW
Inclusions	Included in this unit are small areas of Celio, Tallac, and Woodseye soils, and soils similar to Gefo Variant which are skeletal. Included areas make up about 15 percent of the total area.	
Management Considerations	Gefo Variant soils have coarse textures and a seasonal water table. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.	

GRG Rock outcrop, granitic

Elevation: 6,000 to 8,500 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Barren.
Soil Map Unit Components	**Rock outcrop**
Proportion (percent)	90

Soil Profile Description

Surface Layer	Glaciated granitic rock with some soil material in cracks and crevices.
Subsoil	
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	granitic
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are small areas of Aquolls, Celio, Putt, Tallac, Tinker, and Zeibright soils. Included areas make up about 10 percent of the total area.
Management Considerations	Steep and very steep slopes. Rock outcrop areas produce concentrated surface runoff that can increase erosion on adjacent soils.

HAE Haypress-Toiyabe complex, 2 to 30 percent slopes

Elevation: 5,000 to 5,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Haypress**	**Toiyabe**
Proportion (percent)	45	45

Soil Profile Description

Surface Layer	0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid.	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid.
Subsoil	14 to 49 inches; pale brown loamy coarse sand; massive; medium acid.	8 to 16 inches; pale brown cobbly loamy coarse sand; single grained; strongly acid.
Substratum	49 inches; weathered granitic rock.	16 inches; highly weathered granitic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60	10 to 20
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.2-1.6	0.8-1.0
Permeability: Subsoil Substratum	Rapid Slow	Rapid Moderate
Drainage Class	Somewhat excessively drained	Somewhat excessively drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe to moderate	Severe
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P, WF 60 to 120	 Not rated 60 to 120
Soil Manageability Group Class	 II 2ep	 II 3eD
Inclusions	Included in this unit are small areas of Rock outcrop; in the Roberts Canyon area soils similar to Haypress but with an ochric epipedon. Included areas make up about 10 percent of the total area.	
Management Considerations	Sandy soils and relatively low cation exchange capacity (CEC). Toiyabe soils have a thin surface layer.	

HAG Haypress-Toiyabe complex, 30 to 75 percent slopes

Elevation: 5,200 to 5,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Haypress**	**Toiyabe**
Proportion (percent)	45	40
Soil Profile Description		
Surface Layer	0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid.	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid.
Subsoil	14 to 49 inches; pale brown loamy coarse sand; massive; medium acid.	8 to 16 inches; pale brown cobbly loamy coarse sand; single grained; strongly acid.
Substratum	49 inches; weathered granitic rock.	16 inches; highly weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	10 to 20
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.2-1.6	0.8-1.0
Permeability: Subsoil Substratum	Rapid Slow	Rapid Moderate
Drainage Class	Somewhat excessively drained	Somewhat excessively drained
Max Erosion Hazard	High	Vey high
Seedling Mortality	Severe to moderate	Severe
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P, WF 60 to 120	 Not capable 60 to 120
Soil Manageability Group Class	 III 3Ep	 III 4ED
Inclusions	Included in this unit are small areas of Rock outcrop; in the Roberts Canyon area soils similar to Haypress but with an ochric epipedon. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep and very steep slopes. Sandy soils and relatively low cation exchange capacity (CEC). Toiyabe soils have a thin surface layer.	

HAG2 Haypress-Toiyabe-Rock outcrop complex, 30 to 75 percent slopes, eroded

Elevation: 5,200 to 5,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation	Ceanothus-Mixed conifer series; Mixed conifer-Ceanothus series.		
Soil Map Unit Components	**Haypress, eroded**	**Toiyabe, eroded**	**Rock outcrop**
Proportion (percent)	35	35	20
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown loamy sand; weak granular structure; slightly acid.	0 to 6 inches; brown loamy coarse sand; massive; slightly acid.	Granitic rock.
Subsoil	12 to 48 inches; light gray loamy sand; massive; medium acid.	6 to 12 inches; pale brown loamy coarse sand; single grain structure; medium acid.	
Substratum	48 inches; weathered granitic rock.	12 inches; weathered granitic rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	10 to 20	
Available Water Capacity Class	Very low	Very low	
AWC for top 20”	1.2-1.6	0.7-1.0	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Moderate	
Drainage Class	Somewhat excessively drained	Somewhat excessively drained	
Max Erosion Hazard	High	Very high	
Seedling Mortality	Severe	Severe	
Revegetating Exposed Subsoil	Slight	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	
Soil Manageability Group Class	 IV 4Ep	 IV 4ED	
Inclusions	Included in this unit are small areas of soil similar to Haypress with thin, light colored surface layer, and moderately deep soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Sandy soils have relatively low cation exchange capacity. Toiyabe soils have a thin surface layer. Rock outcrop areas are a potential source of aggregate. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.		

HBE Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,000 to 5,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer series; Jeffrey/Ponderosa series.

Soil Map Unit Components	Haypress	Toiyabe	Cryumbrepts, wet
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid.	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	14 to 49 inches; pale brown loamy coarse sand; massive; medium acid.	8 to 16 inches; pale brown cobbly loamy coarse sand; single grainded; strongly acid.	
Substratum	49 inches; weathered granitic rock.	16 inches; weathered granitic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	10 to 20	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.2-1.6	0.8-1.0	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Moderate	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe to moderate	Severe	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 60 to 120	 Not rated 60 to 120	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 3eD	 II 4EW

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Haypress with a thin, light colored surface layer; and moderately deep soils. Included areas make up about 15 percent of the total area.

Management Considerations: Sandy soils have relatively low cation exchange capacity. Toiyabe soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

HBG Haypress-Toiyabe-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 5,000 to 5,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer series; Jeffrey/Ponderosa series.

Soil Map Unit Components	Haypress	Toiyabe	Cryumbrepts, wet
Proportion (percent)	35	35	15
Soil Profile Description			
Surface Layer	0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid.	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	14 to 49 inches; pale brown loamy coarse sand; massive; medium acid.	8 to 16 inches; pale brown cobbly loamy coarse sand; single grain structure; strongly acid.	
Substratum	49 inches; weathered granitic rock.	16 inches; highly weathered granitic rock.	Stratified loam to clay loam with dark clored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	10 to 20	Variable
Available Water Capacity Class	Very low	Very low	Very low
AWC for top 20”	1.2-1.6	0.8-1.0	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Moderate	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe to moderate	Severe	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 60 to 120	 Not rated 60 to 120	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 3eD	 IV 4EW

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Haypress with a thin, light colored surface layer, and moderately deep soils. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Sandy soils have relatively low cation exchange capacity. Toiyabe soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are suceptible to puddling, and often have impermeable layers between 1and 2 feet.

HOE Hoda-Musick complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Hoda**	**Musick**
Proportion (percent)	50	35

Soil Profile Description

Surface Layer	0 to 7 inches; brown loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; moderate subangular blocky structure; slightly acid.
Subsoil	7 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	8 to 80 inches; red clay loam; massive; medium acid.
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 80	60 to 80
Available Water Capacity Class	Low to high	Moderate to high
AWC for top 20”	2.6-3.4	3.1-3.6
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, WF 240 to 640	 1,2 P, WF 240 to 640
Soil Manageability Group Class	 II 2e	 II 2e
Inclusions	Included in this unit are small areas of Chaix and Holland soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Hoda soils have low subsoils strength when wet..	

HOF Hoda-Musick complex, 30 to 50 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Hoda**	**Musick**
Proportion (percent)	50	35

Soil Profile Description

Surface Layer	0 to 7 inches; brown loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; moderate subangular blocky structure; slightly acid.
Subsoil	7 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	8 to 80 inches; red clay loam; massive; medium acid.
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 80	60 to 80
Available Water Capacity Class	Low to high	Moderate to high
AWC for top 20”	2.6-3.4	3.1-3.6
Permeability: Subsoil Substratum	Slow Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Very high	Very high
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, WF 240 to 640	 1,2 P, WF 240 to 640
Soil Manageability Group Class	 III 3E	 III 3E
Inclusions	Included in this unit are small areas of Chaix and Holland soils, and shallow coarse-loamy soils with argillic horizons; Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. Hoda soils have low subsoils strength when wet.	

HPE Haypress-Hoda-Hotaw complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Holland	Hoda	Hotaw
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 15 inches; brown loam; weak granular structure; slightly acid.	0 to 7 inches; brown loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 65 inches; reddish yellow clay loam; massive; medium acid.	7 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	12 to 34 inches; light yellowish brown sandy clay loam; moderate subangular blocky structure; medium acid.
Substratum			34 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	60 to 100	40 to 80	20 to 40
Available Water Capacity Class	Moderate to high	Low to high	Low to moderate
AWC for top 20”	2.8-3.5	2.6-3.4	2.9-3.6
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, WF 240 to 640	 1,2 P, WF 240 to 640	 2,3 P, DF 50 to 240
Soil Manageability Group Class	 II 2e	 II 2e	 II 2e

Inclusions: Included in this unit are small areas of Chaix and Musick soils. Included areas make up about 10 percent of the total area.

Management Considerations: Hoda soils have low subsoil strength when wet. Hotaw soils are moderately deep.

HPF Holland-Hoda-Hotaw complex, 30 to 50 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Holland	Hoda	Hotaw
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 15 inches; brown loam; weak granular structure; slightly acid.	0 to 7 inches; brown loam; moderate granular structure; slightly acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 65 inches; reddish yellow clay loam; massive; medium acid.	7 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	12 to 34 inches; light yellowish brown sandy clay loam; moderate subangular blocky structure; medium acid.
Substratum			34 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	60 to 100	40 to 80	20 to 40
Available Water Capacity Class	Moderate to high	Low to high	Low to moderate
AWC for top 20”	2.8-3.5	2.6-3.4	2.9-3.6
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Very high	Very high	Very high
Seedling Mortality	Slight	Slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 P, WF 240 to 640	 1,2 P, WF 240 to 640	 2,3 P, DF 50 to 240
Soil Manageability Group Class	 III 3E	 III 3E	 III 3E

Inclusions: Included in this unit are small areas of Chaix and Musick soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Hoda soils have low subsoil strength when wet. Hotaw soils are moderately deep.

HPF2 Holland-Hoda-Hotaw complex, 10 to 40 percent slopes, eroded

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Mixed hardwood series.		
Soil Map Unit Components	**Holland**	**Hoda**	**Hotaw**
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 3 inches; reddish yellow loam; weak platy structure; slightly acid.	0 to 2 inches; brown loam; moderate granular structure; slightly acid.	0 to 5 inches; pale brown loam; weak platy structure; slightly acid.
Subsoil	3 to 53 inches; reddish yellow clay loam; massive; medium acid.	2 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	5 to 21 inches; very pale brown clay loam; massive; medium acid.
Substratum	53 inches; highly weathered grainitic rock.	72 inches; highly weathered grainitic rock.	21 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	60 to 100	40 to 80	20 to 40
Available Water Capacity Class	Low to high	Low to moderate	Very low to low
AWC for top 20”	2.7-3.4	2.6-3.4	2.7-3.2
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 P, DF Not rated	 2,3 P, DF Not rated	 3,4 P, DF Not rated
Soil Manageability Group Class	 IV 4E	 IV 4E	 IV 4E
Inclusions	Included in this unit are small areas of eroded and uneroded Chaix and Musick soils, and uneroded Hoda, Holland, and Hotaw soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Hoda soils have low subsoil strength when wet. Hotaw soils are moderately deep.		

HPF5 Holland-Hoda-Aquolls complex, 2 to 40 percent slopes, altered

Elevation: 2,000 to 3,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Grass series.		
Soil Map Unit Components	**Holland**	**Hoda**	**Aquolls**
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	0 to 3 inches; reddish yellow loam; weak platy structure; slightly acid.	0 to 2 inches; brown loam; moderate granular structure; slightly acid.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	3 to 53 inches; reddish yellow clay loam; massive; medium acid.	2 to 72 inches; reddish yellow clay; moderate angular blocky structure; medium acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.
Substratum	53 inches; highly weathered granitic rock.	72 inches; highly weathered granitic rock.	Stratified alluvium.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	60 to 100	40 to 80	20 to 40
Available Water Capacity Class	Low to high	Low to moderate	Variable
AWC for top 20”	2.7-3.4	2.6-3.4	
Permeability: Subsoil Substratum	Moderately slow Slow	Slow Slow	Variable Slow and very slow
Drainage Class	Well drained	Well drained	Very poorly drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4E	 IV 4E	 IV 4EW
Inclusions	Included in this unit are small areas of Borolls, Chaix , Hotaw, and Musick soils which are altered and unaltered, and unaltered Aquolls, Hoda, and Holland soils. Included areas make up about 30 percent of the total area.		
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Hoda soils have low subsoil strength when wet. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.		

HRE Horseshoe-Jocal-Maiposa complex, 2 to 30 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation: Manzanita-Open conifer series; Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Horseshoe	Jocal	Mariposa
Proportion (percent)	60	15	15
Soil Profile Description			
Surface Layer	0 to 9 inches; brown loam; weak subangular blocky structure; slightly acid.	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.
Subsoil	9 to 55 inches; reddish yellow gravelly clay loam; moderate subangular blocky structure; medium acid.	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.
Substratum	55 to 65 inches; highly weathered silt stone and clay stone.	70 inches; weathered slate and shale.	33 inches; hard and semi-hard metasediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	40 to 70	15 to 33
Available Water Capacity Class	Low to moderate	Low to high	Low
AWC for top 20”	2.5-3.0	2.4-3.1	2.2-2.8
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately slow Moderately slow	Moderate Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	Moderate	High
Seedling Mortality	Slight	Slight	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 4,3 P, DF 120 to 170
Soil Manageability Group Class	 II 2e	 II 2e	 II 2ep

Inclusions: Included in this unit are small areas of Hurlbut and Sites soils, and soils similar to Horseshoe but with brown colors in the surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Mariposa soils are shallow to moderately deep and have a thin surface layer. These soils reach field capacity rapidly and can produce surface runoff.

HSE Huysink-Horseshoe complex, 2 to 30 percent slopes

Elevation: 4,500 to 5,500 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Black oak series.	
Soil Map Unit Components	**Huysink**	**Horseshoe**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 7 inches; dark yellowish brown very stony loam; weak granular structure; slightly acid.	0 to 9 inches; brown loam; weak subangular blocky structure; slightly acid.
Subsoil	7 to 69 inches; reddish yellow extremely stony loam; moderate subangular blocky structure; medium acid.	9 to 55 inches; reddish yellow gravelly clay loam; moderate subangular blocky structure; medium acid.
Substratum		55 to 65 inches; highly weathered silt stone and clay stone.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 65	40 to 80
Available Water Capacity Class	Very low to low	Low to moderate
AWC for top 20”	1.0-1.4	2.5-3.0
Permeability: Subsoil Substratum	Moderate Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	High
Seedling Mortality	Severe	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,1 WF, SP 240 to 640	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 III 3Ep	 III 3E
Inclusions	Included in this unit are small areas of Lorack and Putt soils; soils similar to Horseshoe but with browner colors in the surface layer; soils similar to Huysink and Horseshoe but with thick, dark surface layers; moderately deep, loamy-skeletal soils; and soils without argillic horizons. Included areas make up about 15 percent of the total area.	
Management Considerations	Huysink soils have a high amount of rock fragments.	

HSF Huysink-Horseshoe complex, 30 to 50 percent slopes

Elevation: 4,500 to 5,500 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Mixed conifer-Black oak series.	
Soil Map Unit Components	**Huysink**	**Horseshoe**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 7 inches; dark yellowish brown very stony loam; weak granular structure; slightly acid.	0 to 9 inches; brown loam; weak subangular blocky structure; slightly acid.
Subsoil	7 to 69 inches; reddish yellow extremely stony loam; moderate subangular blocky structure; medium acid.	9 to 55 inches; reddish yellow gravelly clay loam; moderate subangular blocky structure; medium acid.
Substratum		55 to 65 inches; highly weathered silt stone and clay stone.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 65	40 to 80
Available Water Capacity Class	Very low to low	Low to moderate
AWC for top 20”	1.0-1.4	2.5-3.0
Permeability: Subsoil Substratum	Moderate Slow	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe	Slight
Revegetating Exposed Subsoil	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,1 WF, SP 240 to 640	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 III 3Ep	 III 3E
Inclusions	Included in this unit are small areas of soils similar to Huysink which are moderately deep; soils similar to Huysink but with thick, dark surface layers; moderately deep, coarse-loamy soils weathered from rhyolite in the Quaker Hill area; and soils without argillic horizons. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. Huysink soils have a high amount of rock fragments.	

HTF Hotaw, rhyolitic substratum-McCarthy-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 3,000 to 5,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Hotaw, rhyolitic substratum	McCarthy	Cryumbrepts, wet
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; dark grayish brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	12 to 30 inches; light yellowish brown clay loam; moderate subangular blocky structure; slightly acid.	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	
Substratum	30 inches; weathered rhyolitic tuff.	28 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	Variable
Available Water Capacity Class	Low to moderate	Low	Very low
AWC for top 20”	2.9-3.6	2.3-2.6	
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately rapid Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	Very high	High	Very high
Seedling Mortality	Slight	Moderate	Severe
Revegetating Exposed Subsoil	Slight	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, WF 50 to 240	 4 P, WF 120 to 170	 Not capable 170 to 640
Soil Manageability Group Class	 III 3E	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Ponto Variant soils and areas of Horseshoe soils on slopes of less than 30 percent. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Hotaw, rhyolitic substratum soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments. Cyumbrepts, wet have a high water table most of the year, are susceptable to puddling, and often have impermeable layers between 1 and 2 feet.

HUE Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 65 inches

Typical Vegetation: Mixed conifer-Mixed brush series.

Soil Map Unit Components	Hurlbut	Deadwood	Mariposa
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky structure; medium acid.	0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid.	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.
Subsoil	4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid.	3 to 13 inches; light yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; medium acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.
Substratum	27 inches; weathered metasedimentary rock.	13 inches; hard metasedimentary rock.	33 inches; hard and semi-hard metasediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	10 to 20	15 to 33
Available Water Capacity Class	Very low to low	Very low	Low
AWC for top 20”	2.1-2.8	0.4-0.7	2.2-2.8
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderately rapid Slow	Moderate Moderately slow
Drainage Class	Well drained	Somewhat excessively drained	Well drained
Max Erosion Hazard	Moderate	High	High
Seedling Mortality	Moderate to slight	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P 120 to 170	 Not capable 20 to 80	 3,4 P, DF 120 to 170
Soil Manageability Group Class	 II 2ep	 II 3ep	 II 2ep

Inclusions: Included in this unit are small areas of Jocal and Jocal Variant soils; Rock outcrop; and soils similar to Hurlbut with more than 35 percent rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Hurlbut soils are moderately deep and have a thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse textures, and have a high amount of rock fragments. They reach field capacity rapidly and can produce surface runoff. Mariposa soils are shallow to moderately deep and have a thin surface layer. These soils reach field capacity rapidly and can produce surface runoff.

HUE3 Hurlbut, thin surface-Deadwood-Rock outcrop complex, 2 to 30 percent slopes, severely eroded

Elevation: 3,000 to 5,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Manzanita-Open conifer series.

Soil Map Unit Components	Hurlbut, thin surface	Deadwood, severely eroded	Rock outcrop
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 4 inches; pale brown sandy loam; weak granular structure; medium acid.	0 to 1 inches; brown gravelly loam; weak granular structure; slightly acid.	Metasedimentary rock.
Subsoil	4 to 22 inches; yellow gravelly sandy loam; weak subangular blocky structure; medium acid.	1 to 16 inches; strong brown very cobbly loam; weak subangular blocky structure; medium acid.	
Substratum	22 inches; weathered metasedimentary rock.	16 inches; hard metasedimentary rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 30	10 to 20	
Available Water Capacity Class	Very low	Low	
AWC for top 20”	2.1-2.8	1.6-2.2	
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately rapid Slow	
Drainage Class	Well drained	Somewhat excessively drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Moderate	Severe	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	
Soil Manageability Group Class	 III 3Ep	 III 4EP	

Inclusions: Included in this unit are small areas of uneroded Deadwood, Hurlbut, and Mariposa soils. Included areas make up about 15 percent of the total area.

Management Considerations: Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Hurlbut, thin surface soils are moderately deep and have a very thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse soil textures, and a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

HUE5 Hurlbut, thin surface-Hurlbut-Deadwood complex, 2 to 30 percent slopes, altered

Elevation: 3,000 to 5,000 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation: Mixed conifer-Dwarf tanbark series.

Soil Map Unit Components	Hurlbut, thin surface	Hurlbut, altered	Deadwood, altered
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 2 inches; brown loam; weak granular structure; medium acid.	0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky and granular structure; medium acid.	0 to 2 inches; dark grayish brown gravelly loam; weak granular structure; slightly acid.
Subsoil	2 to 22 inches; reddish yellow gravelly loam; massive; medium acid.	4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid.	2 to 17 inches; strong brown very cobbly loam; massive; medium acid.
Substratum	22 inches; weathered metsedimentary rock.	27 inches; weathered metasedimentary rock.	17 inches; hard metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 30	20 to 40	10 to 20
Available Water Capacity Class	Very low	Very low to low	Very low
AWC for top 20”	2.1-2.8	2.1-2.8	1.8-2.4
Permeability: Subsoil Substratum	Moderately slow Slow	Moderate Moderately slow	Moderately rapid Slow
Drainage Class	Well drained	Well drained	Somewhat excessively drained
Max Erosion Hazard	Very high	Very high	Very high
Seedling Mortality	Moderate	Moderate	Moderate to severe
Revegetating Exposed Subsoil	Severe	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4ep	 IV 4eP

Inclusions: Included in this unit are small areas of Jocal and Mariposa soils and Rock outcrop. Included areas make up about 25 percent of the total area.

Management Considerations: Hurlbut, thin surface soils are moderately deep and have a thin surface layer. On-site investigations are needed to determine if corrective treatments are needed. Hurlbut soils are moderately deep and have a thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse textures, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff.

HUG Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 65 inches

Typical Vegetation: Mixed conifer-Mixed brush series; Mixed conifer-Dwarf tanbark series.

Soil Map Unit Components	Hurlbut	Deadwood	Rock outcrop
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky structure; medium acid.	0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid.	Metasedimentary rock.
Subsoil	4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid.	3 to 13 inches; light yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	27 inches; weathered metasedimentary rock.	13 inches; hard metasedimentary rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	10 to 20	
Available Water Capacity Class	Very low to low	Very low	
AWC for top 20”	2.1-2.8	0.4-0.7	
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderately rapid Slow	
Drainage Class	Well drained	Somewhat excessively drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate to slight	Severe	
Revegetating Exposed Subsoil	Moderate	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, DF 120 to 170	 Not capable 20 to 80	
Soil Manageability Group Class	 IV 4Ep	 IV 4EP	

Inclusions: Included in this unit are small areas of Mariposa soils; soils similar to Hurlbut except they have more than 35 percent rock fragments, and deep loamy-skeletal soils. Included areas make up about 25 percent of the total area.

Management Considerations: Steep and very steep slopes. Hurlbut soils are moderately deep and have a thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse textures, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

HUG3 Hurlbut, thin surface-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, severely eroded

Elevation: 3,000 to 5,000 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation: Mixed conifer-Mixed brush series.

Soil Map Unit Components	Hurlbut, thin surface	Deadwood, severely eroded	Rock outcrop
Proportion (percent)	45	30	15
Soil Profile Description			
Surface Layer	0 to 4 inches; pale brown sandy loam; weak granular structure; medium acid.	0 to 1 inches; brown gravelly loam; weak granular structure; slightly acid.	Metasedimentary rock.
Subsoil	4 to 22 inches; yellow gravelly sandy loam; weak subangular blocky structure; medium acid.	1 to 16 inches; strong brown very cobbly loam; weak subangular blocky structure; medium acid.	
Substratum	22 inches; weathered metasedimentary rock.	16 inches; hard metasedimentary rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 30	10 to 20	
Available Water Capacity Class	Very low	Very low	
AWC for top 20”	2.1-2.8	1.6-2.2	
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately rapid Slow	
Drainage Class	Well drained	Somewhat excessively drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Moderate	Severe	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	
Soil Manageability Group Class	 IV 4Ep	 IV 4EP	

Inclusions: Included in this unit are small areas of Hurlbut and Mariposa soils; and deep soils without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Hurlbut, thin surface soils are moderately deep and have a very thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse soil textures, and a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

HUG5 Hurlbut, thin surface-Hurlbut-Deadwood complex, 30 to 75 percent slopes, altered

Elevation: 3,000 to 5,000 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation: Mixed conifer-Dwarf tanbark series.

Soil Map Unit Components	Hurlbut, thin surface	Hurlbut, altered	Deadwood, altered
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 2 inches; brown loam; weak granular structure; medium acid.	0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky and granular structure; medium acid.	0 to 2 inches; dark grayish brown gravelly loam; weak granular structure; slightly acid.
Subsoil	2 to 22 inches; reddish yellow gravelly loam; massive; medium acid.	4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid.	2 to 17 inches; strong brown very cobbly loam; massive; medium acid.
Substratum	22 inches; weathered metsedimentary rock.	27 inches; weathered metasedimentary rock.	17 inches; hard metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 30	20 to 40	10 to 20
Available Water Capacity Class	Very low	Very low to low	Very low
AWC for top 20”	2.1-2.8	2.1-2.8	1.8-2.4
Permeability: Subsoil Substratum	Moderately slow Slow	Moderate Moderately slow	Moderately rapid Slow
Drainage Class	Well drained	Well drained	Somewhat excessively drained
Max Erosion Hazard	Very high	Very high	Very high
Seedling Mortality	Moderate	Moderate	Severe
Revegetating Exposed Subsoil	Severe	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4Ep	 IV 4Ep	 IV 4EP

Inclusions: Included in this unit are small areas of Mariposa, Rock outcrop and deep soils without a clay increase in the subsoil. Included areas make up about 25 percent of the total area.

Management Considerations: Steep and very steep slopes. On-site investigations are needed to determine if corrective treatments are needed. Hurlbut, thin surface soils are moderately deep and have a thin surface layer. Hurlbut soils are moderately deep and have a thin surface layer. Deadwood soils are shallow to hard bedrock, have coarse textures, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff.

HYE Pits, hydraulic

Elevation: 1,500 to 6,700 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Barren; Barren-Mixed brush series.

Soil Map Unit Components: **Pits, hydraulic**

Proportion (percent): 85

Soil Profile Description

Surface Layer: Areas of stones, cobbles, and gravel in stream channels created by hydraulic mining.

Subsoil:

Substratum:

Soil Properties & Management Interpretations

Effective Rooting Depth (inches):

Available Water Capacity Class:

AWC for top 20”:

Permeability: Subsoil
Substratum:

Drainage Class:

Max Erosion Hazard:

Seedling Mortality:

Revegetating Exposed Subsoil:

Soil Productivity
Forest Survey Site Class:
Annual Forage (lbs/acre):

Soil Manageability
Group:
Class:

Inclusions: Included in this unit are small areas of Aiken, Cohasset, Horseshoe, Hurlbut, Jocal, and Mariposa soils. Included areas make up about 15 percent of the total area.

Management Considerations: Hydraulic pits need on-site investigations to determine if watershed restoration is needed.

IME Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Mixed conifer-Black oak series.

Soil Map Unit Components	Ledmount	McCarthy	Rock outcrop
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 18 inches; dark grayish brown sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Merhten mudflow exposures.
Subsoil		15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	
Substratum	18 inches; andesitic tuff breccia.	28 inches; weathered andesitic tuff breccia.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	12 to 20	20 to 40	
Available Water Capacity Class	Very low	Low	
AWC for top 20”	2.3-2.6	2.3-2.6	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Moderately rapid	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate	Moderate	
Revegetating Exposed Subsoil	Severe	Slight	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 20 to 80	 4 DF, P 120 to 170	
Soil Manageability Group Class	 II 2ep	 II 2ep	

Inclusions: Included in this unit are small areas of Crozier and Hurlbut soils; soils similar to Ledmount but with a paralithic contact; and soils with argillic horizons or ochric epipedons . Included areas make up about 10 percent of the total area.

Management Considerations: Ledmount soils are shallow to hard bedrock. These soils reach field capacity rapidly and can produce surface runoff. McCarthy soils are moderately deep and have a high amount of rock fragments. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

IMG Ledmount-McCarthy-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Mixed conifer-Black oak series.

Soil Map Unit Components	Ledmount	McCarthy	Rock outcrop
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 18 inches; dark grayish brown sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Merhten mudflow exposures.
Subsoil		15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	
Substratum	18 inches; andesitic tuff breccia.	28 inches; weathered andesitic tuff breccia.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	12 to 20	20 to 40	
Available Water Capacity Class	Very low	Low	
AWC for top 20”	2.3-2.6	2.3-2.6	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Moderately rapid	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate	Moderate	
Revegetating Exposed Subsoil	Severe	Moderate	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 20 to 80	 4 DF, P 120 to 170	
Soil Manageability Group Class	 IV 4Ep	 IV 4Ep	

Inclusions: Included in this unit are small areas of Crozier and Hurlbut soils; soils similar to Ledmount but with a paralithic contact; soils similar to McCarthy but deeper than 40 inches; and soils with argillic horizons or ochric epipedons . Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. Ledmount soils are shallow to hard bedrock. These soils reach field capacity rapidly and can produce surface runoff. McCarthy soils are moderately deep and have a high amount of rock fragments. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

ISE Forbes-Dubakella complex, 2 to 30 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation	Mixed conifer-California bay series.	
Soil Map Unit Components	**Forbes**	**Dubakella**
Proportion (percent)	65	20

Soil Profile Description

Surface Layer	0 to 20 inches; dark red gravelly loam; weak granular structure; neutral.	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.
Subsoil	20 to 61 inches; strong brown gravelly silty clay; massive; mildly alkaline.	3 to 32 inches; yellowish red very cobbly clay loam; massive; medium acid.
Substratum		32 inches; serpentinitic bedrock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 65	20 to 40
Available Water Capacity Class	Low to moderate	Low
AWC for top 20”	1.1-1.3	2.3-2.6
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Moderate
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, P DF 50 to 240	 5P 70 to 120
Soil Manageability Group Class	 II 2e	 II 2ep

Inclusions

Included in this unit are small areas of soils similar to Dubakella with loamy textures in the subsoil; soils similar to Forbes with more than 35 percent rock fragments in the subsoil; Rock outcrop; soils similar to Forbes with mollic epipedons; and soils similar to Forbes but with brown colors. Included areas make up about 15 percent of the total area.

Management Considerations

Reduced fertility due to the serpentinitic nature of the parent material and low subsoil strength when wet. Dubakella soils have a thin surface layer, are moderately deep, and have a high amount of rock fragments.

ISE5 Forbes-Dubakella complex, 2 to 30 percent slopes, altered

Elevation: 3,000 to 4,000 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation	Plantations.	
Soil Map Unit Components	**Forbes, altered**	**Dubakella, altered**
Proportion (percent)	65	20
Soil Profile Description		
Surface Layer	0 to 13 inches; reddish brown gravelly loam; weak granular structure; neutral.	0 to 4 inches; reddish brown gravelly loam; massive; neutral.
Subsoil	13 to 51 inches; red clay loam; massive; mildly alkaline.	4 to 31 inches; dark reddish brown very cobbly loam; weak subangular blocky structure; neutral.
Substratum	51 inches; highly weathered serpentinized rock.	31 inches; serpentinized bedrock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 65	20 to 40
Available Water Capacity Class	Low to moderate	Low
AWC for top 20”	3.1-3.5	2.2-2.9
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate	Slight to moderate
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4E	 IV 4Ep
Inclusions	Included in this unit are small areas of Rock outcrop and moderately deep, loamy-skeletal soils. Included areas make up about 15 percent of the total area.	
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Reduced fertility due to the serpentinitic nature of the parent material and low subsoil strength when wet. Dubakella soils have a thin surface layer, are moderately deep, and have a high amount of rock fragments.	

ISF Forbes-Dubakella complex, 30 to 50 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation	Mixed conifer-California bay series.	
Soil Map Unit Components	**Forbes**	**Dubakella**
Proportion (percent)	65	20

Soil Profile Description

Surface Layer	0 to 20 inches; dark red gravelly loam; weak granular structure; neutral.	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.
Subsoil	20 to 61 inches; strong brown gravelly silty clay; massive; mildly alkaline.	3 to 32 inches; yellowish red very cobbly clay loam; massive; medium acid.
Substratum		32 inches; serpentinitic bedrock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 65	20 to 40
Available Water Capacity Class	Low to moderate	Low
AWC for top 20”	2.4-2.9	2.3-2.6
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Moderate
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3, P DF 50 to 240	 5P 70 to 120
Soil Manageability Group Class	 III 3E	 III 3Ep

Inclusions

Included in this unit are small areas of Rock outcrop; soils similar to Dubakella with loamy textures in the subsoil; soils similar to Forbes with mollic epipedons and/or loamy textures in the subsoil; and moderately deep, loamy-skeletal soils. Included areas make up about 15 percent of the total area.

Management Considerations

Steep soils. Reduced fertility due to the serpentinitic nature of the parent material and low subsoil strength when wet. Dubakella soils have a thin surface layer, are moderately deep, and have a high amount of rock fragments.

JSE Jorge-Cryumbrepts, wet-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Jorge	Cryumbrepts, wet	Tahoma
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.		8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.	41 inches; highly weathered andesitic tuff.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	Variable	40 to 60
Available Water Capacity Class	Very low to low	Very low	Low
AWC for top 20”	1.7-1.8	2.3-2.6	2.3-2.7
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Poorly drained	Well drained
Max Erosion Hazard	High	Very high	High
Seedling Mortality	Moderate	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 Not capable 170 to 640	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 II 2p	 II 4EW	 II 2ep

Inclusions: Included in this unit are small areas of Fugawee soils, Rubble land, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Jorge soils have coarse textures and a high amount of rock fragments. Cyumbrepts, wet hve a high water table most of the year, are susceptible to puddling, and often have an impermeable layer between 1 and 2 feet.

JSG Jorge-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.	
Soil Map Unit Components	**Jorge**	**Cryumbrepts, wet**
Proportion (percent)	65	20
Soil Profile Description		
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	Variable
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.7-1.8	
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Very slow
Drainage Class	Well drained	Poorly drained
Max Erosion Hazard	High	Very high
Seedling Mortality	Moderate	Severe
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated 50 to 240	 Not capable 170 to 640
Soil Manageability Group Class	 IV 4ep	 IV 4EW
Inclusions	Included in this unit are small areas of Fugawee and Tahoma soils, Rubble land, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep and very steep slopes. Jorge soils have coarse textures and a high amount of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.	

JTE Jorge-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Jorge**	**Tahoma**
Proportion (percent)	65	20

Soil Profile Description

Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	41 inches; highly weathered andesitic tuff.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60	40 to 60
Available Water Capacity Class	Very low to low	Low
AWC for top 20”	1.7-1.8	2.3-2.7
Permeability: Subsoil Substratum	Moderate Moderate	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 II 2p	 II 2ep

Inclusions

Included in this unit are small areas of Fugawee and Tahoma soils, Rubble land, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations

Jorge soils have coarse textures and a high amount of rock fragments.

JTF Jorge very stony sandy loam, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Mixed conifer series; Red fir series.
Soil Map Unit Components	**Jorge very stony sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low to low
AWC for top 20”	1.7-1.8
Permeability: Subsoil Substratum	Moderate Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140
Soil Manageability Group Class	 III 3epX
Inclusions	Included in this unit are small areas of Fugawee and Tahoma soils, Rubble land, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.
Management Considerations	Steep slopes. Jorge soils have coarse textures and a high amount of rock fragments.

JUE Jorge-Rubble land complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Mixed conifer-Barren series; Red fir-Barren series.	
Soil Map Unit Components	**Jorge**	**Rubble land**
Proportion (percent)	55	30

Soil Profile Description

Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	Angular stones and cobbles. Some soil material between fragments.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low to low
AWC for top 20”	1.7-1.8
Permeability: Subsoil Substratum	Moderate Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140
Soil Manageability Group Class	 II 2p
Inclusions	Included in this unit are small areas of Fugawee and Tahoma soils and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.
Management Considerations	Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate.

JUG Jorge-Rubble land complex, 30 to 75 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Mixed conifer-Barren series; Red fir-Barren series.	
Soil Map Unit Components	**Jorge**	**Rubble land**
Proportion (percent)	55	30

Soil Profile Description

Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	Angular stones and cobbles. Some soil material between fragments.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low to low
AWC for top 20”	1.7-1.8
Permeability: Subsoil Substratum	Moderate Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140
Soil Manageability Group Class	 IV 4ep
Inclusions	Included in this unit are small areas of Fugawee, Tahoma and Umpa soils, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate.

JWE Jorge-Waca-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Mixed conifer series; Red fir series.

Soil Map Unit Components	Jorge	Waca	Tahoma
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	32 inches; weathered andesitic tuff breccia.	41 inches; highly weathered andesitic tuff.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	40 to 60
Available Water Capacity Class	Very low to low	Low	Low
AWC for top 20”	1.7-1.8	2.1-2.3	2.3-2.7
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	Moderate	High
Seedling Mortality	Moderate	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 4,5 RF, WF 60 to 140	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 II 2p	 II 2ep	 II 2ep

Inclusions: Included in this unit are small areas of Fugawee and Windy soils, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Jorge soils have coarse textures and a high amount of rock fragments. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum.

JWF Jorge-Waca-Tahoma complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Mixed conifer series; Red fir series.

Soil Map Unit Components	Jorge	Waca	Tahoma
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	32 inches; weathered andesitic tuff breccia.	41 inches; highly weathered andesitic tuff.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	40 to 60
Available Water Capacity Class	Very low to low	Low	Low
AWC for top 20”	1.7-1.8	2.1-2.3	2.3-2.7
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 4,5 RF, WF 60 to 140	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 3ep	 III 3ep	 III 3ep

Inclusions: Included in this unit are small areas of Fugawee and Windy soils, and soils similar to Jorge without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Jorge soils have coarse textures and a high amount of rock fragments. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum.

JXE Jorge-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Jorge	Waca	Cryumbrepts, wet
Proportion (percent)	25	25	20
Soil Profile Description			
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Low	Very low
AWC for top 20”	1.7-1.8	2.1-2.3	
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	Moderate	Very high
Seedling Mortality	Slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 4,5 RF, WF 60 to 1400	 Not capable 170 to 640
Soil Manageability Group Class	 II 2p	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Fugawee, Tahoma, and Windy soils; Included areas make up about 30 percent of the total area.

Management Considerations: Jorge soils have coarse textures with a high amount of rock fragments. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts wet, have a high watertable most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

JXF Jorge-Waca-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Jorge	Waca	Cryumbrepts, wet
Proportion (percent)	25	25	20
Soil Profile Description			
Surface Layer	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Low	Very low
AWC for top 20”	1.7-1.8	2.1-2.3	
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	Moderate	Very high
Seedling Mortality	Slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140	 4,5 RF, WF 60 to 1400	 Not capable 170 to 640
Soil Manageability Group Class	 III 3ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Fugawee, Tahoma, and Windy soils; Included areas make up about 30 percent of the total area.

Management Considerations: Steep slopes. Jorge soils have coarse textures with a high amount of rock fragments. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts wet, have a high watertable most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

JYE Jocal-Sites-Mariposa complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer series; Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Jocal	Sites	Mariposa
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid.	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.
Subsoil	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.	9 to 45 inches; yellowish brown very gravelly clay; massive; medium acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.
Substratum	70 inches; weathered slate and shale.	45 inches; weathered metasedimentary rock.	33 inches; hard and semi-hard metasediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 70	40 to 65	15 to 33
Available Water Capacity Class	Low to high	Low to moderate	Low
AWC for top 20”	2.4-3.1	2.6-3.1	2.2-2.8
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow to slow Slow	Moderate Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	High
Seedling Mortality	Slight	Moderate to slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 4,3 P DF 120 to 170
Soil Manageability Group Class	 II 2e	 II 2e	 II 2ep

Inclusions: Included in this unit are small areas of Aiken, Cohasset, Crozier, and Hurlbut soils; Included areas make up about 15 percent of the total area.

Management Considerations: Sites soils have low subsoil strength when wet. Mariposa soils are shallow and moderately deep, have a thin surface layer, and they reach field capacity rapidly and can produce surface runoff.

JYE5 Jocal-Sites-Mariposa complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation	Plantation; Grass series.		
Soil Map Unit Components	**Jocal, altered**	**Sites, altered**	**Mariposa, altered**
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 9 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 4 inches; dark reddish brown loam; moderate granular structure; slightly acid.	0 to 6 inches; brown loam; weak granular structure; slightly acid.
Subsoil	9 to 50 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.	4 to 43 inches; reddish yellow cobbly clay; massive; medium acid.	6 to 21 inches; reddish yellow cobbly clay loam; massive; medium acid.
Substratum	metasedimentary rock.	43 inches; weathered metasedimentary rock.	21 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 70	40 to 65	15 to 33
Available Water Capacity Class	Low to moderate	Low to moderate	Very low to low
AWC for top 20”	2.2-3.0	2.7-3.3	2.7-3.2
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow to slow Slow	Moderate Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight to moderate	Slight to moderate	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e	 IV 4ep
Inclusions	Included in this unit are small areas of Aiken, Cohasset, Crozier, and Hurlbut soils; Included areas make up about 15 percent of the total area.		
Management Considerations	Soils have been disturbed. On-site investgations are needed to detemine if corrective treatments are needed. Sites soils have low subsoil strength when wet. Mariposa soils are shallow and moderately deep, have a thin surface layer, and they reach field capacity rapidly and can produce surface runoff.		

JYF Jocal-Sites-Mariposa complex, 30 to 50 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer series; Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Jocal	Sites	Mariposa
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid.	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.
Subsoil	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.	9 to 45 inches; yellowish brown very gravelly clay; massive; medium acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.
Substratum	70 inches; weathered slate and shale.	45 inches; weathered metasedimentary rock.	33 inches; hard and semi-hard metasediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 70	40 to 65	15 to 33
Available Water Capacity Class	Low to high	Low to moderate	Low
AWC for top 20”	2.4-3.1	2.6-3.1	2.2-2.8
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow to slow Slow	Moderate Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	High
Seedling Mortality	Slight	Moderate to slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 3,4 P DF 120 to 170
Soil Manageability Group Class	 III 3E	 III 3E	 III 3Ep

Inclusions: Included in this unit are small areas of Aiken, Cohasset, Crozier, and Hurlbut soils; Included areas make up about 15 percent of the total area.

Management Considerations: Steep. slopes. Sites soils have low subsoil strength when wet. Mariposa soils are shallow and moderately deep, have a thin surface layer, and they reach field capacity rapidly and can produce surface runoff.

JZG Jocal-Jocal Variant-Cryumbrepts, wet complex, 50 to 70 percent slopes, altered

Elevation: 2,000 to 5,000 feet Annual Precipitation: 45 to 65 inches

Typical Vegetation: Mixed conifer-Dogwood/Maple series; Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Jocal	Jocal Variant	Cryumbrepts, wet
Proportion (percent)	40	30	15
Soil Profile Description			
Surface Layer	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 5 inches; light brown graveely silt loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sndy lom, silt loam, and clay loam; gravelly, cobbly or stony.
Subsoil	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.	5 to 65 inches; reddish yellow very gravelly clay; weak subangular blocky structure; medium acid.	
Substratum	70 inches; weathered slate and shale.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 70	60 to 80	Variable
Available Water Capacity Class	Low to high	Low to moderate	Very low
AWC for top 20”	2.4-3.1	2.7-3.3	
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Slight	Moderate	Severe
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P Not rated	 3,4 P, DF Not rated	 Not capable Not rated
Soil Manageability Group Class	 IV 4E	 IV 4Ep	 IV 4EW

Inclusions: Included in this unit are small areas of Hurlbut and Mariposa soils; soils similar to Hurlbut but with more than 35 percent rock fragments; soils similar to Jocal but without a clay increase in the subsoil; soils similar to Jocal but with more than 35 percent rock fragments; and soils similar to Jocal but with yellower colors (10YR hue). Included areas make up about 15 percent of the total area.

Management Considerations: Very steep slopes. Jocal Variant soils have a high amount of rock fragments. Cryumbrepts, wet soils have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

KIE Kinkel Variant-Cohasset complex, 2 to 30 percent slopes

Elevation: 4,800 to 5,800 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Mixed conifer-Mixed brush series; Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Kinkel Variant**	**Cohasset**
Proportion (percent)	50	35
Soil Profile Description		
Surface Layer	0 to 14 inches; dark reddish brown gravelly sandy loam; weak granular structure; medium acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	14 to 54 inches; strong brown very gravelly clay loam; massive; medium acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	54 inches; weathered andesitic rock.	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	40 to 80
Available Water Capacity Class	Very low to low	Moderate to high
AWC for top 20”	1.5-1.9	2.6-3.4
Permeability: Subsoil Substratum	Moderate Moderate	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Severe to moderate	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, WF 50 to 240	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 II 2p	 II 2e
Inclusions	Included in this unit are small areas of Crozier and McCarthy soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Kinkel Variant soils have a high amount of rock fragments.	

KIE5 Kinkel Variant-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 5,300 to 5,500 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Mixed conifer-Mixed brush series; Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Kinkel Variant, altered**	**Cohasset, altered**
Proportion (percent)	50	35
Soil Profile Description		
Surface Layer	0 to 5 inches; dark yellowish brown gravelly loam; weak granular structure; slightly acid.	0 to 12 inches; brown loam; massive; neutral.
Subsoil	5 to 42 inches; strong brown very cobbly clay loam; weak subangular blocky structure; medium acid.	12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.
Substratum	42 inches; weathered volcanic rock.	65 inches; weathered mudflow.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	40 to 80
Available Water Capacity Class	Very low	Low to moderate
AWC for top 20”	2.9-3.3	2.8-3.5
Permeability: Subsoil Substratum	Moderate Moderate	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to severe	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4p	 IV 4e
Inclusions	Included in this unit are small areas of Crozier and McCarthy soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Kinkel Variant soils have a high amount of rock fragments.	

KIF Kinkel Variant-Cohasset complex, 30 to 50 percent slopes

Elevation: 4,800 to 5,500 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Mixed conifer-Mixed brush series; Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Kinkel Variant**	**Cohasset**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 14 inches; dark reddish brown gravelly sandy loam; weak granular structure; medium acid.	0 to 12 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	14 to 54 inches; strong brown very gravelly clay loam; massive; medium acid.	12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.
Substratum	54 inches; weathered andesitic rock.	61 inches; weathered andesitic conglomerate.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	40 to 80
Available Water Capacity Class	Very low to low	Moderate to high
AWC for top 20”	1.5-1.9	2.6-3.4
Permeability: Subsoil Substratum	Moderate Moderate	Moderately slow Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe to moderate	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, WF 50 to 240	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 III 3ep	 III 3E
Inclusions	Included in this unit are small areas of Crozier and McCarthy soils; Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. Kinkel Variant soils have a high amount of rock fragments.	

KJF Kinkel Variant-Rock outcrop complex, 2 to 40 percent slopes, altered

Elevation: 4,800 to 5,500 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Mixed conifer-Mixed brush series.	
Soil Map Unit Components	**Kinkel Variant**	**Rock outcrop**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 14 inches; dark reddish brown gravelly sandy loam; weak granular structure; medium acid.	Basalt rock.
Subsoil	14 to 54 inches; strong brown very gravelly clay loam; massive; medium acid.	
Substratum	54 inches; weathered andesitic rock.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low to low
AWC for top 20”	1.5-1.9
Permeability: Subsoil Substratum	Moderate Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, WF 50 to 240
Soil Manageability Group Class	 II 2p
Inclusions	Included in this unit are small areas of Cohasset, Crozier and Ledmount soils; Included areas make up about 15 percent of the total area.
Management Considerations	Kinkel Variant soils have a high amount of rock fragments. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

KME Kyburz-Aldi complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer-Sagebrush series.	
Soil Map Unit Components	**Kyburz**	**Aldi**
Proportion (percent)	65	25
Soil Profile Description		
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; weak granular structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structre; very strongly acid.	8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.
Substratum	34 inches; weathered andesitic rock.	18 inches; weathered andesite.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	10 to 20
Available Water Capacity Class	Low	Very low to low
AWC for top 20”	2.2-2.7	2.7-3.3
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Slow Very slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 Not capable 120 to 190
Soil Manageability Group Class	 II 2ep	 II 2e
Inclusions	Included in this unit are small areas of Franktown and Trojan soils; soils similar to Franktown and Aldi but with a paralithic contact; and shallow soils with a fine-loamy argillic horizon. Included areas make up about 10 percent of the total area.	
Management Considerations	Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, they reach field capacity rapidly, and can produce surface runoff.	

KME5 Kyburz-Aldi complex, 2 to 30 percent slopes, altered

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer-Sagebrush series.	
Soil Map Unit Components	**Kyburz, altered**	**Aldi, altered**
Proportion (percent)	65	25
Soil Profile Description		
Surface Layer	0 to 5 inches; dark grayish brown sandy loam; moderate granular structure; medium acid.	0 to 2 inches; grayish brown gravelly loam; massive; neutral.
Subsoil	5 to 27 inches; brown sandy clay loam; moderate subangular blocky structre; mediumacid.	2 to 18 inches; brown clay loam; moderate subangular blocky structure; slightly acid.
Substratum	27 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).	18 inches; hard to slightly weathered volcanic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	10 to 20
Available Water Capacity Class	Low	Very low
AWC for top 20”	2.6-3.1	2.2-2.6
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Slow Very slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Slight to moderate
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4e
Inclusions	Included in this unit are small areas of Franktown and Trojan soils, Rock outcrop, and shallow soils with a fine-loamy argillic horizon. Included areas make up about 10 percent of the total area.	
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, they reach field capacity rapidly, and can produce surface runoff.	

KMF Kyburz-Aldi complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer-Sagebrush series.	
Soil Map Unit Components	**Kyburz**	**Aldi**
Proportion (percent)	65	25
Soil Profile Description		
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; weak granular structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structre; very strongly acid.	8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.
Substratum	34 inches; weathered andesitic rock.	18 inches; weathered andesite.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	10 to 20
Available Water Capacity Class	Low	Very low to low
AWC for top 20”	2.2-2.7	2.7-3.3
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Slow Very slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Very high
Seedling Mortality	Slight	Slight
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 Not capable 120 to 190
Soil Manageability Group Class	 III 3Ep	 III 3E

Inclusions: Included in this unit are small areas of Franktown and Trojan soils; soils similar to Franktown and Aldi but with a paralithic contact above 20 inches; and shallow soils with a fine-loamy argillic horizon. Included areas make up about 10 percent of the total area.

Management Considerations: steep slopes. Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, they reach field capacity rapidly, and can produce surface runoff.

KMF2 Kyburz-Aldi complex, 30 to 50 percent slopes, eroded

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer-Sagebrush series.	
Soil Map Unit Components	**Kyburz, eroded**	**Aldi, eroded**
Proportion (percent)	65	25

Soil Profile Description

Surface Layer	0 to 4 inches; brown loam; moderate granular structure; slightly acid.	0 to 2 inches; grayish brown gravelly loam; massive; neutral.
Subsoil	4 to 23 inches; brown cobbly loam; moderate subangular blocky structre; mediumacid.	2 to 18 inches; brown clay loam; moderate subangular blocky structure; slightly acid.
Substratum	23 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).	18 inches; hard to slightly weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	10 to 20
Available Water Capacity Class	Low	Very low
AWC for top 20”	2.4-3.1	2.2-2.6
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Slow Very slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Very high
Seedling Mortality	Slight	Slight to moderate
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P, WF Not rated	 Not capable Not rated
Soil Manageability Group Class	 IV 4Ep	 IV 4E

Inclusions

Included in this unit are small areas of Franktown and Trojan soils, Rock outcrop, and shallow soils with a fine-loamy argillic horizon. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes and a relatively short growing season. Surface soils have been eroded. On-site investigations are necessary to determine if corretive treatment is needed. Kyburz soils are moderately deep and have a thin surface layer. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, they reach field capacity rapidly, and can produce surface runoff.

KPC Aldi-Aquolls-Kyburz complex, 2 to 9 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation: Sagebrush/Bitterbrush-Meadow/Willow series; Mixed conifer series.

Soil Map Unit Components	Aldi	Aquolls	Kyburz
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; brown loam; weak granular structure; slightly acid.	Thick and dark colored; stratified coarse sand to clay.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	18 inches; weathered andesite.	Stratified alluvium.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	10 to 20	10 to 30	20 to 40
Available Water Capacity Class	Very low to low	Variable	Low
AWC for top 20”	2.7-3.3		2.2-2.7
Permeability: Subsoil Substratum	Slow Very slow	Variable Slow to very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Very poorly drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Severe	Slight
Revegetating Exposed Subsoil	Severe	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 120 to 190	 Not capable 1,040 to 2,670	 5,6 P 120 to 190
Soil Manageability Group Class	 II 2e	 II 4EW	 II 2p

Inclusions: Included in this unit are small areas of Borolls, Franktown, and Sattley soils, and soils similar to Kyburz but with an umbric epipedon. Included areas make up about 15 percent of the total area.

Management Considerations: Relatively short growing season. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, and they reach field capacity rapidly and can produce surface runoff. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Kyburz soils are moderately deep and have a thin surface layer.

KRE Kyburz-Rock outcrop-Trojan complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Kyburz**	**Rock outcrop**	**Trojan**
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Volcanic rock.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.		10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.
Substratum	34 inches; weathered andesitic rock.		67 inches; slightly fractured andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 80
Available Water Capacity Class	Low		Low to moderate
AWC for top 20”	2.2-2.7		1.8-2.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Moderate to slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190		 4,5 P, WF 190 to 240
Soil Manageability Group Class	 II 2ep		 II 2ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

KRF Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Kyburz**	**Rock outcrop**	**Trojan**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Volcanic rock.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.		10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.
Substratum	34 inches; weathered andesitic rock.		67 inches; slightly fractured andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 80
Available Water Capacity Class	Low		Low to moderate
AWC for top 20”	2.2-2.7		1.8-2.5
Permeability: Subsoil Substratum	Moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Moderate to slight
Revegetating Exposed Subsoil	Slight		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190		 4,5 P, WF 190 to 240
Soil Manageability Group Class	 III 3Ep		 III 3Ep
Inclusions	Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

KRF2 Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes,eroded

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 35 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Kyburz,eroded**	**Rock outcrop**	**Trojan, eroded**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 4 inches; brown loam; moderate granular structure; slightly acid.	Volcanic rock.	0 to 5 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil	4 to 23 inches; brown cobbly loam; moderate subangular blocky structure; medium acid.		5 to 48 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.
Substratum	23 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).		48 inches; weathered volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		40 to 80
Available Water Capacity Class	Low		Low to moderate
AWC for top 20”	2.4-3.1		2.0-2.6
Permeability: Subsoil Substratum	Moderately slow Moderately slow		Moderately slow Moderately slow
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Slight		Moderate
Revegetating Exposed Subsoil	Moderate		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P, WF Not rated		 5 P, WF Not rated
Soil Manageability Group Class	 IV 4Ep		 IV 4Ep
Inclusions	Included in this unit are small areas of Sattley soils and shallow soils with fine-loamy argillic horizons. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes and a relatively short growing season. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatment is needed. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

KRG Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Sagebrush/Bitterbrush-Mixed conifer series.		
Soil Map Unit Components	**Aldi**	**Kyburz**	**Rock outcrop**
Proportion (percent)	30	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; brown loam; weak granular structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	Volcanic rock.
Subsoil	8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	
Substratum	18 inches; weathered andesite.	34 inches; weathered andesitic rock.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	10 to 20	20 to 40	
Available Water Capacity Class	Very low to low	Low	
AWC for top 20”	2.7-3.3	2.2-2.7	
Permeability: Subsoil Substratum	Slow Very slow	Moderately slow Moderately slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Slight	Slight	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 120 to 190	 5,6 P 120 to 190	
Soil Manageability Group Class	 IV 4E	 IV 4Ep	
Inclusions	Included in this unit are small areas of Franktown, Sattley, and Trojan soils; soils similar to Aldi but with a paralithic contac; soils similar to Kyburz but with a mollic epipedon; and shallow soils with a fine-loamy argillic horizon. Included areas make up about 35 percent of the total area.		
Management Considerations	Steep and very steep slopes. Relatively short growing season. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, and they reach field capacity rapidly and can produce surface runoff. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcropo can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate		

KRG2 Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes, eroded

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Sagebrush/Bitterbrush-Mixed conifer series.		
Soil Map Unit Components	**Aldi, eroded**	**Kyburz, eroded**	**Rock outcrop**
Proportion (percent)	30	20	15
Soil Profile Description			
Surface Layer	0 to 2 inches; grayish brown gravelly loam; massive; neutral.	0 to 4 inches; brown loam; moderate granular structure; slightly acid.	Volcanic rock.
Subsoil	2 to 18 inches; brown clay loam; moderate subangular blocky structure; slightly acid.	4 to 23 inches; brown cobbly loam; moderate subangular blocky structure; medium acid.	
Substratum	18 inches; hard to slightly weathered volcanic rock.	23 inches; weathered andesitic rock (andesitic flow rock or tuff breccia).	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	10 to 20	20 to 40	
Available Water Capacity Class	Very low	Low	
AWC for top 20”	2.2-2.6	2.4-3.1	
Permeability: Subsoil Substratum	Slow Very slow	Moderately slow Moderately slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	Vey high	High	
Seedling Mortality	Slight to moderate	Slight	
Revegetating Exposed Subsoil	Moderate	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable Not rated	 6 P Not rated	
Soil Manageability Group Class	 IV 4E	 IV 4Ep	

Inclusions

Included in this unit are small areas of Franktown, Sattley, and Trojan soils, and shallow soils with a fine-loamy argillic horizon. Included areas make up about 35 percent of the total area.

Management Considerations

Steep and very steep slopes. Relatively short growing season. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatment is needed. Aldi soils are shallow to hard bedrock and thay have very low subsoil strength when wet. The subsoil tends to perch water during the spring, and they reach field capacity rapidly and can produce surface runoff. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcropo can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate

KVE Kyburz-Trojan-Aquolls complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Meadow/Willow series.

Soil Map Unit Components	Kyburz	Trojan	Aquolls
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	Thick and dark colored; stratified coarse sand to clay.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.
Substratum	34 inches; weathered andesitic rock.	67 inches; slightly fractured andesite.	Stratified alluvium.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	40 to 80	10 to 30
Available Water Capacity Class	Low	Low to moderate	Variable
AWC for top 20”	2.2-2.7	1.8-2.5	
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow	Variable Slow to very slow
Drainage Class	Well drained	Well drained	Very poorly drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate to slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P 120 to 190	 4,5 P, WF 190 to 240	 Not capable 1,040 to 2,670
Soil Manageability Group Class	 II 2ep	 II 2e	 II 4EW

Inclusions: Included in this unit are small areas of Aldi, Jorge, Kyburz, Sierraville, and Waca soils; Borolls; and deep very gravelly alluvial soils. Included areas make up about 15 percent of the total area.

Management Considerations: Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

LCE Ledford-Ledford Variant complex, 2 to 30 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Ledford**	**Ledford Variant**
Proportion (percent)	45	40
Soil Profile Description		
Surface Layer	0 to 15 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid.
Subsoil	15 to 56 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	56 inches; highly weathered granitic rock.	28 inches; weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	20 to 40
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.4-2.2	1.3-2.1
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow
Drainage Class	Excessively drained	Excessively drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 RF, WF 140 to 180	 4 RF, WF 100 to 140
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Rock outcrop; similar soils with a thin light colored surface layers; and similar soils with more than 35 percent rock fragments. Included areas make up about 15 percent of the total area.	
Management Considerations	Coarse textures and a relatively low cation exchange capacity. Ledford Variant soils are moderately deep and have a thin surface layer.	

LCF Ledford-Ledford Variant complex, 30 to 50 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Ledford**	**Ledford Variant**
Proportion (percent)	45	40
Soil Profile Description		
Surface Layer	0 to 15 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid.
Subsoil	15 to 56 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.	7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	56 inches; highly weathered granitic rock.	28 inches; weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	20 to 40
Available Water Capacity Class	Very low to low	Very low
AWC for top 20”	1.4-2.2	1.3-2.1
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow
Drainage Class	Excessively drained	Excessively drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 RF, WF 140 to 180	 4 RF, WF 100 to 140
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Rock outcrop; similar soils with a thin light colored surface layers; and similar soils with more than 35 percent rock fragments. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep slopes. Coarse textures and a relatively low cation exchange capacity. Ledford Variant soils are moderately deep and have a thin surface layer.	

LDE Ledford-Ledford Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Ledford	Ledford Variant	Cryumbrepts, wet
Proportion (percent)	35	35	15
Soil Profile Description			
Surface Layer	0 to 15 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	15 to 56 inches; pale brown very gravelly coarse sandy loam; massive; medium acid.	7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	56 inches; highly weathered granitic rock.	28 inches; weathered granitic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.4-2.2	1.3-2.1	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow	Moderately rapid Very slow
Drainage Class	Excessively drained	Excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate to slight	Moderate to slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF, WF 140 to 180	 4 RF, WF 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Rock outcrop; similar soils with a thin light colored surface layers; similar soils with more than 35 percent rock fragments; and similar soils with a cambic horizon. Included areas make up about 15 percent of the total area.

Management Considerations: Ledford and Ledford Variant soils have coarse textures and a relatively low cation exchange capacity. Ledford Variant soils are moderately deep and have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

LDF Ledford-Ledford Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Ledford	Ledford Variant	Cryumbrepts, wet
Proportion (percent)	35	35	15
Soil Profile Description			
Surface Layer	0 to 15 inches; brown sandy loam; weak granular structure; slightly acid.	0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	15 to 56 inches; pale brown very gravelly coarse sandy loam; massive; medium acid.	7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	56 inches; highly weathered granitic rock.	28 inches; weathered granitic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.4-2.2	1.3-2.1	
Permeability: Subsoil Substratum	Rapid Slow	Rapid Slow	Moderately rapid Very slow
Drainage Class	Excessively drained	Excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate to slight	Moderate to slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF, WF 140 to 180	 4 RF, WF 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Ledford and Ledford Variant but with more than 35 percent rock fragments or ochric epipedons; soils similar to Ledford Variant but with dark colors in the A horizon extending below 20 inches; and similar soils with a cambic horizon. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Ledford and Ledford Variant soils have coarse textures and a relatively low cation exchange capacity. Ledford Variant soils are moderately deep and have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

LOE Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Lorack	Smokey	Cryumbrepts, wet
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid.	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 56 inches; yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; strongly acid.	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	
Substratum	56 to 76 inches; extremely gravelly sandy loam; weakly cemented; extremely acid.	24 inches; weathered metasedimentary rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	45 to 70	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.0-1.4	1.3-1.8	
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderate Slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe	Moderate	Severe
Revegetating Exposed Subsoil	Moderate	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF, SP 140 to 220	 4,5 RF, SP 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of soils similar to Lorack but with a thick dark surface layer; moderately deep soils similar to Lorack; soils similar to Lorack but with less than 35 percent rock fragments and with redder colors; deep soils with less than 35 percent rock fragments; and soils from ultra-basic rock near Black Mountain. Included areas make up about 10 percent of the total area.

Management Considerations: Lorack soils have a high amount of rock fragments. Smokey soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

LOF Lorack-Smokey-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Lorack	Smokey	Cryumbrepts, wet
Proportion (percent)	45	20	15
Soil Profile Description			
Surface Layer	0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid.	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 56 inches; yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; strongly acid.	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	
Substratum	56 to 76 inches; extremely gravelly sandy loam; weakly cemented; extremely acid.	24 inches; weathered metasedimentary rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	45 to 70	20 to 40	Variable
Available Water Capacity Class	Very low to low	Very low	Very low
AWC for top 20”	1.0-1.4	1.3-1.8	
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderate Slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe	Moderate	Severe
Revegetating Exposed Subsoil	Moderate	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF 140 to 220	 4,5 RF 100 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of soils similar to Lorack but with a thick dark surface layer; moderately deep soils similar to Lorack; soils similar to Lorack but with less than 35 percent rock fragments and with redder colors; deep soils with less than 35 percent rock fragments; and soils from ultra-basic rock near Black Mountain. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Lorack soils have a high amount of rock fragments. Smokey soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

MAE Mariposa-Jocal complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Mariposa**	**Jocal**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.
Subsoil	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.
Substratum	33 inches; hard and semi-hard metasediments.	70 inches; weathered slate and shale.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	15 to 33	40 to 70
Available Water Capacity Class	Low	Low to high
AWC for top 20”	2.2-2.8	2.4-3.1
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, DF 120 to 170	 1,2 P, DF 240 to 640
Soil Manageability Group Class	 II 2ep	 II 2e
Inclusions	Included in this unit are small areas of Hurlbut soils; metamorphic Rock outcrop; similar soils but with more than 35 percent rock fragments; and shallow soils with argillic horizons. Included areas make up about 15 percent of the total area.	
Management Considerations	Mariposa soils are shallow and moderately deep, and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff.	

MAE5 Mariposa-Jocal complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,000 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Plantation.	
Soil Map Unit Components	**Mariposa**	**Jocal**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 6 inches; brown loam; weak granular structure; slightly acid.	0 to 9 inches; reddish brown loam; weak granular structure; slightly acid.
Subsoil	6 to 21 inches; reddish brown cobbly clay loam; weak angular blocky structure; medium acid.	9 to 50 inches; reddish brown gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	21 inches; weathered metasedimentary rock.	50 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	15 to 33	40 to 70
Available Water Capacity Class	Very low to low	Low to moderate
AWC for top 20”	2.7-3.2	2.2-3.0
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight to moderate	Slight to moderate
Revegetating Exposed Subsoil	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4e
Inclusions	Included in this unit are small areas of Hurlbut and Sites soils, Rock outcrop, and areas where slopes are 30 to 50 percent. Included areas make up about 15 percent of the total area.	
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Mariposa soils are shallow and moderately deep, and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff.	

MAG Mariposa-Jocal complex, 30 to 75 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation	Hardwoods-Mixed conifer series; Mixed conifer-Black oak series.	
Soil Map Unit Components	**Mariposa**	**Jocal**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.
Subsoil	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.
Substratum	33 inches; hard and semi-hard metasediments.	70 inches; weathered slate and shale.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	15 to 33	40 to 70
Available Water Capacity Class	Low	Low to high
AWC for top 20”	2.2-2.8	2.4-3.1
Permeability: Subsoil Substratum	Moderate Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 P, DF 120 to 170	 1,2 P, DF 240 to 640
Soil Manageability Group Class	 IV 4Ep	 IV 4E
Inclusions	Included in this unit are small areas of Deadwood and Hurlbut soils; Rock outcrop; similar soils but with more than 35 percent rock fragments; colluvial soils similar to Jocal with more than 35 percent rock fragments; and deep soils without argillic horizons. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep and very steep slopes. Mariposa soils are shallow and moderately deep, and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff.	

MCE McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Mixed conifer-Mixed Hardwood series; Mixed conifer-Mixed brush series.

Soil Map Unit Components	McCarthy	Ledmount	Crozier
Proportion (percent)	50	20	20
Soil Profile Description			
Surface Layer	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 18 inches; dark grayish brown sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.		15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	28 inches; weathered andesitic tuff breccia.	18 inches; andesitic tuff breccia.	38 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Low	Very low	Low to moderate
AWC for top 20”	2.3-2.6	2.3-2.6	2.6-3.4
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	Moderate
Seedling Mortality	Moderate	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 DF, P 120 to 170	 Not capable 20 to 80	 2,3 DF, P 50 to 440
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 2e

Inclusions: Included in this unit are small areas of Cohasset and Waca soils; Rock outcrop; soils similar to Crozier without argillic horizons; soils similar to McCarthy but with less than 35 percent rock fragments; soils similar to McCarthy but with an ochric epipedon; soils that are deeper and soils that have browner colors in the subsoils than McCarthy. Included areas make up about 10 percent of the total area.

Management Considerations: McCarthy soils are moderately deep and have a high amount of rock fragments. Ledmount soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Crozier soils are moderately deep.

MCE5 McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Plantation.		
Soil Map Unit Components	**McCarthy, altered**	**Ledmount, altered**	**Crozier, altered**
Proportion (percent)	50	20	20
Soil Profile Description			
Surface Layer	0 to 10 inches; brown gravelly sandy loam; moderate granular structure; neutral.	0 to 11 inches; dark brown cobbly sandy loam; moderate granular structure; slightly acid.	0 to 3 inches; brown loam; massive; slightly acid.
Subsoil	10 to 28 inches; brown very cobbly loam; weak subangular blocky structure; neutral.		3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.
Substratum	28 inches; weathered tuff breccia.	11 inches; hard tuff breccia mudflow.	38 inches; weathered tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Low	Very low	Low to moderate
AWC for top 20”	2.6-3.0	1.4-1.7	2.6-3.3
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate	Severe	Slight
Revegetating Exposed Subsoil	Slight	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4Ep	 IV 4e
Inclusions	Included in this unit are small areas of Cohasset and Waca soils, and Rock outcrop. Included areas make up about 10 percent of the total area.		
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corretive treatments are needed. McCarthy soils are moderately deep and have a high amount of rock fragments. Ledmount soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Crozier soils are moderately deep.		

MCG McCarthy-Ledmount-Crozier complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation	Mixed conifer-Mixed Hardwood series; Mixed conifer-Mixed brush series.		
Soil Map Unit Components	**McCarthy**	**Ledmount**	**Crozier**
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 18 inches; dark grayish brown sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown loam; moderate granular structure; slightly acid.
Subsoil	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.		15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	28 inches; weathered andesitic tuff breccia.	18 inches; andesitic tuff breccia.	38 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Low	Very low	Low to moderate
AWC for top 20”	2.3-2.6	2.3-2.6	2.6-3.4
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	Moderate
Seedling Mortality	Moderate	Moderate	Slight
Revegetating Exposed Subsoil	Moderate	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 DF, P 120 to 170	 Not capable 20 to 80	 3,4 DF, P 50 to 440
Soil Manageability Group Class	 IV 4Ep	 IV 4Ep	 IV 4E
Inclusions	Included in this unit are small areas of Cohasset, Meis, and Waca soils; Rock outcrop; soils similar to McCarthy but with less than 35 percent rock fragments; soils similar to McCarthy but with an ochric epipedon; soils similar to McCarthy but are deeper or have browner colors in the subsoil; and deep fine-loamy soils with an umbric epipedon. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep and very steep slopes. McCarthy soils are moderately deep and have a high amount of rock fragments. Ledmount soils are shallow to hard bedrock. They reach field capacity rapidly, and can produce surface runoff. Crozier soils are moderately deep.		

MCG6 McCarthy-Ledmount-Crozier complex, 30 to 60 percent slopes, terraced

Elevation: 4,000 to 4,800 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation: Mixed conifer-Mixed brush series; Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	McCarthy, terraced	Ledmount, terraced	Crozier, terraced
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 7 inches; grayish brown loam; moderate granular structure; slightly acid.	0 to 10 inches; grayish brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 6 inches; strong brown loam; moderate granular structure; slightly acid.
Subsoil	7 to 32 inches; brown very cobbly loam; massive; medium acid.		6 to 38 inches; red clay loam; weak subangular blocky structure; medium acid.
Substratum	32 inches; weathered tuff breccia mudflow.	10 inches; hard tuff breccia mudflow.	38 inches; weathered tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	20 to 40
Available Water Capacity Class	Low	Very low	Low to moderate
AWC for top 20”	2.7-3.0	1.3-1.5	3.1-3.6
Permeability: Subsoil Substratum	Moderately rapid Moderately slow	Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4Ep	 IV 4Ep	 IV 4E

Inclusions: Included in this unit are small areas of Cohasset soils and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. These areas have been terraced. On-site investigations are necessary to determine if corrective treatment is needed. McCarthy soils are moderately deep and have a high amount of rock fragments. Ledmount soils are shallow to hard bedrock. They reach field capacity rapidly, and can produce surface runoff. Crozier soils are moderately deep.

MEB Martis-Euer Variant complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,000 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation	Sagebrush/Bitterbrush-Jeffrey/Ponderosa series; Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Martis**	**Euer Variant**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 17 inches; dark brown sandy loam; moderate granular structure; strongly acid.	0 to 12 inches; grayish brown gravelly sandy loam; moderately platy structure; slightly acid.
Subsoil	17 to 67 inches; brown gravelly sandy clay loam; massive; medium acid.	12 to 70 inches; pale brown very gravelly clay loam; weak subangular blocky structure; strongly acid.
Substratum		
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 70	40 to 70
Available Water Capacity Class	Low to moderate	Low
AWC for top 20”	1.7-2.4	2.0-2.6
Permeability: Subsoil Substratum	Moderately slow Rapid	Moderately slow Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 120 to 190	 5,4 P 120 to 190
Soil Manageability Group Class	 II 2p	 II 2p
Inclusions	Included in this unit are small areas of Euer, Kyburz, and Martis Variant soils; Aquolls with dense substrata within 2 feet; similar soils but with ochric epipedons; soils similar to Martis but without a clay increase in the subsoil, or which are less than 40 inches deep. Included areas make up about 15 percent of the total area.	
Management Considerations	Short growing season. Martis soils are moderately deep to a root limiting, dense subsoil; are susceptible to puddling in the spring, and have a coarse textured surface layer. The substratum of Euer Variant soil is a potential source of gravel.	

MHG Meiss-Gullied land-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 6,000 to 10,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia series.		
Soil Map Unit Components	**Meiss**	**Gullied land**	**Rock outcrop**
Proportion (percent)	45	20	20

Soil Profile Description

Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	A netwrok of moderately deep to deep V-shaped channels. Many have eroded down to bedrock. Erosion may be active.	Merhten mudflow exposures.
Subsoil			
Substratum	19 inches; hard volcanic rock.		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20
Available Water Capacity Class	Very low
AWC for top 20”	2.6-2.9
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160
Soil Manageability Group Class	 IV 4Ed
Inclusions	Included in this unit are small areas of Waca soils; some Cryumbrepts, wet may be located in gullies; alluvial fans may be present at the bottom of gullies; and soils similar to Meis but with 35 to 45 percent rock fragments. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. These lands need on-site investigations to determine if restoration is needed. Meiss soils are shallow to hard bedrock. They reach field capacity rapidly, and can produce surface runoff. Gullied land and Rock outcrop areas produce concentrated runoff that can increase erosion on adjacent soils.

MIE Meiss-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 6,000 to 10,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia series.	
Soil Map Unit Components	**Meiss**	**Rock outcrop**
Proportion (percent)	70	15

Soil Profile Description

Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	Merhten mudflow exposures.
Subsoil		
Substratum	19 inches; hard volcanic rock.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20
Available Water Capacity Class	Very low
AWC for top 20”	2.6-2.9
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160
Soil Manageability Group Class	 II 2ed
Inclusions	Included in this unit are small areas of Waca soils; soils similar to Meiss over basic rocks with 35 to 75 percent rock fragments; soils similar to Meiss but with loamy sand textures; and shallow soils without a lithic contact. Included areas make up about 15 percent of the total area.
Management Considerations	Meiss soils are shallow to hard bedrock. They reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

MIG Meiss-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 6,000 to 10,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia series.	
Soil Map Unit Components	**Meiss**	**Rock outcrop**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	Merhten mudflow exposures.
Subsoil		
Substratum	19 inches; hard volcanic rock.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20
Available Water Capacity Class	Very low
AWC for top 20”	2.6-2.9
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160
Soil Manageability Group Class	 IV 4Ed
Inclusions	Included in this unit are small areas of Waca soils; soils similar to Meiss with 35 to 75 percent rock fragments; soils similar to Meiss but with loamy sand textures; and very shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Meiss soils are shallow to hard bedrock. They reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

MIG3 Meiss-Rock outcrop complex, 30 to 75 percent slopes, severely eroded

Elevation: 6,500 to 9,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia series.	
Soil Map Unit Components	**Meiss, severely eroded**	**Rock outcrop**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 2 inches; grayish brown gravelly loamy sand; sinlge grain structure; slightly acid.	Merhten mudflow exposures.
Subsoil	2 to 11 inches; brown gravelly sandy loam; massive; slightly acid.	
Substratum	11 inches; hard to slightly weathered volcanic rock.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20
Available Water Capacity Class	Very low
AWC for top 20”	1.2-1.4
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained
Max Erosion Hazard	Very high
Seedling Mortality	Severe
Revegetating Exposed Subsoil	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable Not rated
Soil Manageability Group Class	 IV 4Ed
Inclusions	Included in this unit are small areas of Waca soils; soils similar to Meiss with 35 to 75 percent rock fragments; soils similar to Meiss but with ochric epipedons; aalluvial fans at the bottom of the unit; and very shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatment is needed. Meiss soils are shallow to hard bedrock. They reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

MKE Meiss-Waca complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia-Red fir series.	
Soil Map Unit Components	**Meiss**	**Waca**
Proportion (percent)	55	30

Soil Profile Description

Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.
Subsoil		12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.
Substratum	19 inches; hard volcanic rock.	32 inches; weathered andesitic tuff breccia.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20	20 to 40
Available Water Capacity Class	Very low	Low
AWC for top 20”	2.6-2.9	2.1-2.3
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Slow
Drainage Class	Somewhat excessively drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Slight	Moderate to slight
Revegetating Exposed Subsoil	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 4,5 RF, WF 60 to 140
Soil Manageability Group Class	 II 2ed	 II 2ep

Inclusions

Included in this unit are small areas of Windy soils; Rock outcrop; soils similar to Meiss but with 35 to 75 percent rock fragments; soils similar to Waca but with less than 35 percent rock fragments; and deep glacial soils with more than 35 percent rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations

Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Waca soils are moderately deep and have a high amount of rock fragments. Snowmelt tends to accumulate for short periods over the impermeable substratum.

MKF Meiss-Waca complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Wyethia-Red fir series.	
Soil Map Unit Components	**Meiss**	**Waca**
Proportion (percent)	55	30

Soil Profile Description

Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.
Subsoil		12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.
Substratum	19 inches; hard volcanic rock.	32 inches; weathered andesitic tuff breccia.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	12 to 20	20 to 40
Available Water Capacity Class	Very low	Low
AWC for top 20”	2.6-2.9	2.1-2.3
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Slow
Drainage Class	Somewhat excessively drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Slight	Moderate to slight
Revegetating Exposed Subsoil	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 4,5 RF, WF 60 to 140
Soil Manageability Group Class	 III 3Ed	 III 3Ep
Inclusions	Included in this unit are small areas of Windy soils; Rock outcrop; soils similar to Meiss but with a high amount of rock fragments; and soils similar to Waca but with less than 35 percent rock fragments.	
Management Considerations	Steep slopes. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Waca soils are moderately deep and have a high amount of rock fragments. Snowmelt tends to accumulate for short periods over the impermeable substratum.	

MKF3 Meiss-Waca-Rock outcrop complex, 30 to 50 percent slopes, severely eroded

Elevation: 6,500 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Wyethia series; Wyethia-Red fir series.		
Soil Map Unit Components	**Meiss, severely eroded**	**Waca, severely eroded**	**Rock outcrop**
Proportion (percent)	45	30	15
Soil Profile Description			
Surface Layer	0 to 2 inches; grayish brown gravelly loamy sand; single grain structure; slightly acid.	0 to 9 inches; dark grayish brown loamy sand; weak granular structure; slightly acid.	Merhten mudflow exposures.
Subsoil	2 to 11 inches; brown gravelly sandy loam; massive; slightly acid.	9 to 21 inches; brown very cobbly sandy loam; massive; medium acid.	
Substratum	11 inches; hard to slightly weathered volcanic rock.	21 inches; slightly weathered tuff breccia mudflow.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	12 to 20	20 to 40	
Available Water Capacity Class	Very low	Very low	
AWC for top 20”	1.2-1.4	2.6-2.9	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Slow	
Drainage Class	Somewhat excessively drained	Well drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Severe	Moderate	
Revegetating Exposed Subsoil	Severe	Slight	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	
Soil Manageability Group Class	 IV 4Ed	 IV 4Ep	
Inclusions	Included in this unit are small areas of soils similar to Meis but with high amounts of rock fragments; soils similar to Meiss but with ochric epipedons; and very shallow soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Surface soils have been eroded and on-site investigations are necessary to determine if corrective treatments are needed. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Rock outcrop areas produce concentrated runoff that can increase erosion on adjacent soils.		

MLE Meiss-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation: Wyethia-Alder/Willow series; Red fir series.

Soil Map Unit Components	Meiss	Waca	Cryumbrepts, wet
Proportion (percent)	50	30	15
Soil Profile Description			
Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	19 inches; hard volcanic rock.	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	12 to 20	20 to 40	Variable
Available Water Capacity Class	Very low	Low	Very low
AWC for top 20”	2.6-2.9	2.1-2.3	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Well drained	Poorly drained
Max Erosion Hazard	High	Moderate	Very high
Seedling Mortality	Slight	Slight to moderate	Severe
Revegetating Exposed Subsoil	Severe	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 4,5 RF, WF 60 to 160	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ed	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Windy soils; Rock outcrop; soils similar to Meis but with high amounts of rock fragments; and soils similar to Waca but with low amounts of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

MLG Meiss-Waca-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation: Wyethia-Alder/Willow series; Red fir series.

Soil Map Unit Components	Meiss	Waca	Cryumbrepts, wet
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	19 inches; hard volcanic rock.	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	12 to 20	20 to 40	Variable
Available Water Capacity Class	Very low	Low	Very low
AWC for top 20”	2.6-2.9	2.1-2.3	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Somewhat excessively drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Slight	Slight to moderate	Severe
Revegetating Exposed Subsoil	Severe	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 4,5 RF, WF 60 to 140	 Not capable 170 to 640
Soil Manageability Group Class	 IV 4Ed	 IV 4Ep	 IV 4EW

Inclusions: Included in this unit are small areas of Windy soils and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

MMG Rock outcrop, metamorphic-Putt-Deadwood complex, 30 to 75 percent slopes

Elevation: 3,600 to 6,000 feet Annual Precipitation: 60 to 65 inches

Typical Vegetation: Barren-Mixed conifer series.

Soil Map Unit Components	Rock outcrop, metamorphic	Putt	Deadwood
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	Glaciated metamorphic rock.	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid.	0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid.
Subsoil		20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.	3 to 13 inches; light yellowish brown exteremely gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum			13 inches; hard metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	metamorphic	20 to 34	Variable
Available Water Capacity Class		Very low	Very low
AWC for top 20”		0.9-1.1	0.4-0.7
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately rapid Slow
Drainage Class		Well drained	Somewhat excessively drained
Max Erosion Hazard		High	High
Seedling Mortality		Severe	Severe
Revegetating Exposed Subsoil		Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5P 70 to 120	 7 P 20 to 80
Soil Manageability Group Class		 IV 4EP	 IV 4EP

Inclusions: Included in this unit are small areas of Zeibright soils and shallow soils with a high amount of rock fragments underlain by rock or a duripan. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. High amounts of rock fragments. Putt soils are moderately deep and have a root restricting pan. Deadwood soils are shallow to hard bedrock and have coarse textures. They reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff for areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

MMH Rock outcrop, metamorphic-Rubble land-Gullied land complex

Elevation: 3,500 to 8,500 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Barren; Barren-Mixed conifer series.

Soil Map Unit Components	Rock outcrop, metamorphic	Rubble land	Gullied land
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	Glaciated metamorphic rock.	Angular stones and cobbles with some soil material between rock fragments.	Mostly exposed andesitic tuff-breccia with some thin soil material on the gully sides.
Subsoil			
Substratum			
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	metamorphic		
Available Water Capacity Class			
AWC for top 20”			
Permeability: Subsoil			
Substratum			
Drainage Class			
Max Erosion Hazard			
Seedling Mortality			
Revegetating Exposed Subsoil			
Soil Productivity			
Forest Survey Site Class			
Annual Forage (lbs/acre)			
Soil Manageability			
Group			
Class			

Inclusions: Included in this unit are small areas of Woodseye soils. Included areas make up about 15 percent of the total area.

Management Considerations: Very steep slopes (50 to 100 percent). Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rubble land areas have a potential of raveling. Gullied land areas produce concentrated surface runoff that can increase the erosion on adjacent soils. This land needs on-site investigations to determine if restoration is needed. Metamorphic Rock outcrop and Rubble land areas are a potential source of aggregate.

MMRE Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation: Barren-Conifer/Meadows series; Mixed brush-Conifer/Meadows series.

Soil Map Unit Components	Rock outcrop, metamorphic	Tinker	Cryumbrepts, wet
Proportion (percent)	50	15	10
Soil Profile Description			
Surface Layer	Glaciated metamorphic rock.	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Thick and dark colored; sratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.	
Substratum		33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.	Stratfied loam to clay loam with dark colored mottles; gravelly, cobbly or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	metamorphic	22 to 40	Variable
Available Water Capacity Class		Very low	Very low
AWC for top 20”		1.4-1.6	
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately rapid Slow
Drainage Class		Well drained	Somewhat excessively drained
Max Erosion Hazard		High	High
Seedling Mortality		Severe to moderate	Severe
Revegetating Exposed Subsoil		Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 7 270 to 380	 Not capable 170 to 640
Soil Manageability Group Class		 IV 4EpX	 IV 4EW

Inclusions: Included in this unit are small areas of Putt, Smokey, Tallac, and Woodseye soils. Included areas make up about 25 percent of the total area.

Management Considerations: Concentrated surface runoff for areas of Rock outcrop can increase erosion on adjacent soils. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Metamorphic Rock outcrop areas are a potential source of aggregate.

MMRG Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation: Barren-Conifer/Meadows series; Mixed brush-Conifer/Meadows series.

Soil Map Unit Components	Rock outcrop, metamorphic	Tinker	Cryumbrepts, wet
Proportion (percent)	50	15	10
Soil Profile Description			
Surface Layer	Glaciated metamorphic rock.	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Thick and dark colored; sratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.	
Substratum		33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.	Stratfied loam to clay loam with dark colored mottles; gravelly, cobbly or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	metamorphic	22 to 40	Variable
Available Water Capacity Class		Very low	Very low
AWC for top 20”		1.4-1.6	
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately rapid Slow
Drainage Class		Well drained	Somewhat excessively drained
Max Erosion Hazard		High	Very high
Seedling Mortality		Severe to moderate	Severe
Revegetating Exposed Subsoil		Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 7 270 to 380	 Not capable 170 to 640
Soil Manageability Group Class		 IV 4EpX	 IV 4EW

Inclusions: Included in this unit are small areas of Putt, Smokey, Tallac, and Woodseye soils; and moderately deep soils with an umbric epipedon and a high amount of rock fragments. Included areas make up about 25 percent of the total area.

Management Considerations: Steep and very steep slopes. Concentrated surface runoff for areas of Rock outcrop can increase erosion on adjacent soils. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Metamorphic Rock outcrop areas are a potential source of aggregate.

MNG Rock outcrop, metamorphic-Woodseye complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Barren-Mixed brush series.	
Soil Map Unit Components	**Rock outcrop, metamorphic**	**Woodseye**
Proportion (percent)	70	15

Soil Profile Description

Surface Layer	Glaciated metamorphic rock.	0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid.
Subsoil		14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid.
Substratum		19 inches; hard metasedimentary rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	metmorphic	9 to 20
Available Water Capacity Class		Very low
AWC for top 20”		0.6-1.0
Permeability: Subsoil Substratum		Moderate Very slow
Drainage Class		Somewhat excessively drained
Max Erosion Hazard		High
Seedling Mortality		Severe
Revegetating Exposed Subsoil		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 Not capable 160 to 270
Soil Manageability Group Class		 IV 4EP

Inclusions

Included in this unit are small areas of Lorack, Smokey, and Tinker soils; Rubble land; and soils similar to Woodseye but with thin dark surface layers. Included areas make up about 15 percent of the total area.

Management Considerations

Steep and very steep slopes. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Woodseye soils are shallow to hard bedrock, have a thin surface layer, and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Metamorphic Rock outcrop areas are a potential source of aggregate.

MOE Franktown-Aldi-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 5,200 to 6,500 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation: Sagebrush-Bitterbrush series; Sagebrush-Mahogany series.

Soil Map Unit Components	Franktown	Aldi	Rock outcrop
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 15 inches; brown gravelly loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; weak granular structure; slightly acid.	Volcanic rock.
Subsoil		8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.	
Substratum	15 inches; weathered volcanic rock.	18 inches; weathered andesite.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	15 to 20	10 to 20	
Available Water Capacity Class	Very low	Very low to low	
AWC for top 20”	1.1-1.3	2.7-3.3	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Slow Very slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Severe	Slight	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 120	 Not capable 120 to 190	
Soil Manageability Group Class	 II 2ep	 II 2e	

Inclusions: Included in this unit are small areas of Kyburz soils; soils similar to Aldi but are fine-loamy; soils similar to Franktown but have an ochric epipedon; and moderately deep soils similar to Franktown. Included areas make up about 15 percent of the total area.

Management Considerations: Franktown soils are shallow to bedrock and have a high amount of rock fragments. Aldi soils are shallow to hard bedrock, have very low subsoil strength when wet, and have a subsoil that tends to perch water during the spring. Both of these soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff for areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

MOG Franktown-Aldi-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,200 to 6,500 feet Annual Precipitation: 15 to 30 inches

Typical Vegetation: Sagebrush-Bitterbrush series; Sagebrush-Mahogany series.

Soil Map Unit Components	Franktown	Aldi	Rock outcrop
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 15 inches; bown gravelly loam; moderate granular structure; slightly acid.	0 to 8 inches; brown loam; weak granular structure; slightly acid.	Volcanic rock.
Subsoil		8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral.	
Substratum	15 inches; weathered volcanic rock.	18 inches; weathered andesite.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	15 to 20	10 to 20	
Available Water Capacity Class	Very low	Very low to low	
AWC for top 20”	1.1-1.3	2.7-3.3	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Slow Very slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	Very high	Very high	
Seedling Mortality	Severe	Slight	
Revegetating Exposed Subsoil	Severe	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 120	 Not capable 120 to 190	
Soil Manageability Group Class	 IV 4Ep	 IV 4E	

Inclusions: Included in this unit are small areas of Kyburz soils; soils similar to Aldi but are fine-loamy; soils similar to Franktown but with a low amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Franktown soiuls are shallow to bedrock and have a high amount of rock fragments. Aldi soils are shallow to hard bedrock, have very low subsoil strength when wet, and have a subsoil that tends to perch water during the spring. Both of these soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff for areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

MPC Fugawee Variant-Aquolls-Fugawee complex, 2 to 9 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation: Sagebrush/Bitterbrush-Meadow/Willow series.

Soil Map Unit Components	Fugawee Variant	Aquolls	Fugawee
Proportion (percent)	25	20	15
Soil Profile Description			
Surface Layer	0 to 5 inches; dark brown loam; moderate granular structure; neutral.	Thick and dark colored; stratified coarse sand to clay.	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.
Subsoil	5 to 18 inches; dark brown cobbly clay loam; moderate subangular blocky structure; strongly acid.	Stratified layers with mottles; sandy loam to clay; some are very gravelly.	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.
Substratum	18 inches; weathered andesitic rock.	Stratified alluvium.	35 inches; weathered andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	15 to 20	10 to 30	20 to 40
Available Water Capacity Class	Very low	Variable	Low
AWC for top 20”	2.5-3.0		2.1-2.7
Permeability: Subsoil Substratum	Slow Very slow	Variable Slow to very slow	Moderate to moderately slow Moderately slow
Drainage Class	Well drained	Very poorly drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate to slight	Severe	Slight
Revegetating Exposed Subsoil	Severe	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 Not capable 1,040 to 2,670	 5,6 P 70 to 120
Soil Manageability Group Class	 II 2e	 II 4EW	 II 2p

Inclusions: Included in this unit are small areas of Jorge, Kyburz, Tahoma, and Trojan soils; Borolls; and shallow soils with a clayey subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Fugawee Variant soils are shallow to bedrock and have a thin surface layer. These soils reach field capacity rapidly and can produce surface runoff. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Fugawee soils are moderately deep and have a thin surface layer.

MRE Fugawee Variant-Fugawee complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation	Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.	
Soil Map Unit Components	**Fugawee Variant**	**Fugawee**
Proportion (percent)	55	30
Soil Profile Description		
Surface Layer	0 to 5 inches; dark brown loam; moderate granular structure; neutral.	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.
Subsoil	5 to 18 inches; dark brown cobbly clay loam; massive; slightly acid.	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.
Substratum	18 inches; weathered andesitic rock.	35 inches; weathered andesite.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	15 to 20	20 to 40
Available Water Capacity Class	Very low	Low
AWC for top 20”	2.5-3.0	2.1-2.7
Permeability: Subsoil Substratum	Slow Very slow	Moderate to moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 5,6 P 70 to 120
Soil Manageability Group Class	 II 2e	 II 2ep
Inclusions	Included in this unit are small areas of Jorge and Tahoma soils; Rock outcrop; and shallow soils with a clayey subsoil. Included areas make up about 15 percent of the total area.	
Management Considerations	Fugawee Variant soils are shallow to bedrock, have a thin surface layer, reach field capacity rapidly, and can produce surface runoff. Fugawee soils are moderately deep and have a thin surface layer.	

MRG Fugawee Variant-Fugawee-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit Components	Fugawee Variant	Fugawee	Rock outcrop
Proportion (percent)	25	20	15
Soil Profile Description			
Surface Layer	0 to 5 inches; dark brown loam; moderate granular structure; neutral.	0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid.	Volcanic rock.
Subsoil	5 to 18 inches; dark brown cobbly clay loam; moderate subangular blocky structure; strongly acid.	7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.	
Substratum	18 inches; weathered andesitic rock.	35 inches; weathered andesite.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	15 to 20	20 to 40	
Available Water Capacity Class	Very low	Low	
AWC for top 20”	2.5-3.0	2.1-2.7	
Permeability: Subsoil Substratum	Slow Very slow	Moderate to moderately slow Moderately slow	
Drainage Class	Well drained	Well drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate to slight	Slight	
Revegetating Exposed Subsoil	Moderate	Slight	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 60 to 160	 5,6 P 70 to 120	
Soil Manageability Group Class	 IV 4E	 IV 4Ep	

Inclusions: Included in this unit are small areas of Jorge, Kyburz, and Tahoma soils; and shallow soils with a clayey subsoil. Included areas make up about 20 percent of the total area.

Management Considerations: Steep and very steep slopes. Fugawee Variant soils are shallow to bedrock and have a thin surface layer. These soils reach field capacity rapidly and can produce surface runoff. Fugawee soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

MUE Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,500 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Tahoma Variant	Hotaw Variant	Cryumbrepts, wet
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	0 to 5 inches; bown gravelly loam; weak granular structure; medium acid.	0 to 4 inches; brown gravelly loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	5 to 48 inches; strong brown clay loam; moderate subangular blocky structure; strongly acid.	4 to 38 inches; reddish yellow gravelly clay loam; moderate subangular blocky structure; medium.	
Substratum	48 inches; highly weathered granitic rock.	38 inches; weathered granitic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	20 to 40	Variable
Available Water Capacity Class	Low to moderate	Low	Very low
AWC for top 20”	2.4-2.9	2.6-3.0	
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately slow Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF 140 to 220	 3,2 RF 140 to 220	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 2e	 II 4EW

Inclusions: Included in this unit are small areas of Chaix Variant, Holland, Hotaw, and Musick soils; Rock outcrop; soils similar to Hotaw Variant but with redder colors and clay loam textures in the A horizon; shallow coarse-loamy soils; and shallow, loamy-skeletal glacial soils. Included areas make up about 30 percent of the total area.

Management Considerations: Tahoma Variant soils have very acid subsoils. Hotaw Variant soils are moderately deep, have a low cation exchange capacity, and have very acid subsoils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

MUF Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,500 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Red fir-Alder/Willow series.

Soil Map Unit Components	Tahoma Variant	Hotaw Variant	Cryumbrepts, wet
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	0 to 5 inches; bown gravelly loam; weak granular structure; medium acid.	0 to 4 inches; brown gravelly loam; weak granular structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	5 to 48 inches; strong brown clay loam; moderate subangular blocky structure; strongly acid.	4 to 38 inches; reddish yellow gravelly clay loam; moderate subangular blocky structure; medium acid.	
Substratum	48 inches; highly weathered granitic rock.	38 inches; weathered granitic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	20 to 40	Variable
Available Water Capacity Class	Low to moderate	Low	Very low
AWC for top 20”	2.4-2.9	2.6-3.0	
Permeability: Subsoil Substratum	Moderately slow Slow	Moderately slow Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	Very high	Very high
Seedling Mortality	Slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 2,3 RF 140 to 220	 3,2 RF 140 to 220	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3E	 III 4EW

Inclusions: Included in this unit are small areas of Chaix Variant, Holland, Hotaw, and Musick soils; Rock outcrop; soils similar to Hotaw Variant but with redder colors and clay loam textures in the A horizon; shallow coarse-loamy soils; and shallow, loamy-skeletal glacial soils. Included areas make up about 30 percent of the total area.

Management Considerations: Steep slopes. Tahoma Variant soils have very acid subsoils. Hotaw Variant soils are moderately deep, have a low cation exchange capacity, and have very acid subsoils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

PBE Portola gravelly fine sandy loam, 2 to 30 percent slopes

Elevation: 5,000 to 6,000 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.
Soil Map Unit Components	**Portola gravelly fine sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 3 inches; brown gravelly fine sandy loam; weak granular structure; strongly acid.
Subsoil	3 to 39 inches; pale brown gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	39 inches; weathered rhyolite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.0-2.3
Permeability: Subsoil Substratum	Rapid Slow
Drainage Class	Well drained
Max Erosion Hazard	Moderate
Seedling Mortality	Moderate to slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P 120 to 190
Soil Manageability Group Class	 II 2ep
Inclusions	Included in this unit are small areas of Kyburz soils; Rock outcrop; soils similar to Portola but with clay or clay loam in the subsoil and with or without a thick dark surface layer; and shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Portola soils are moderately deep and have a thin surface layer.

PBF Portola gravelly fine sandy loam, 30 to 50 percent slopes

Elevation: 5,000 to 6,000 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Mixed conifer series; Jeffrey/Ponderosa series.
Soil Map Unit Components	**Portola gravelly fine sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 3 inches; brown gravelly fine sandy loam; weak granular structure; strongly acid.
Subsoil	3 to 39 inches; pale brown gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	39 inches; weathered rhyolite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.0-2.3
Permeability: Subsoil Substratum	Rapid Slow
Drainage Class	Well drained
Max Erosion Hazard	Moderate
Seedling Mortality	Moderate to slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P 120 to 190
Soil Manageability Group Class	 III 3Ep
Inclusions	Included in this unit are small areas of Kyburz soils; Rock outcrop; soils similar to Portola but with clay or clay loam in the subsoil and with or without a thick dark surface layer; and shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Steep slopes. Portola soils are moderately deep and have a thin surface layer.

PCG Portola-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,000 to 6,000 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Mixed conifer-Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Portola**	**Rock outcrop**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 3 inches; brown gravelly fine sandy loam; weak granular structure; strongly acid.	Volcanic rock.
Subsoil	3 to 39 inches; pale brown gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	39 inches; weathered rhyolite.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.0-2.3
Permeability: Subsoil Substratum	Rapid Slow
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Moderate to slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 6 P 120 to 190
Soil Manageability Group Class	 IV 4Ep
Inclusions	Included in this unit are small areas of Kyburz soils; Rock outcrop; soils similar to Portola but with clay or clay loam in the subsoil and with or without a thick dark surface layer; and shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Portola soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

PME Putt-McCarthy-Zeibright complex, 2 to 30 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Putt**	**McCarthy**	**Zeibright**
Proportion (percent)	30	30	25
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum		28 inches; weathered andesitic tuff breccia.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34	20 to 40	40 to 80
Available Water Capacity Class	Very low	Low	Very low to low
AWC for top 20”	0.9-1.1	2.3-2.6	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Moderately slow	Moderately rapid Rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Severe	Moderate	Severe to moderate
Revegetating Exposed Subsoil	Slight	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170	 4 P, WF 120 to 170	 3 P, WF 50 to 240
Soil Manageability Group Class	 II 4ePX	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Crozier and Ledmount soils. Included areas make up about 30 percent of the total area.		
Management Considerations	High amounts of rock fragments. Putt soils are moderately deep to a root restricting pan. McCarthy soils are moderately deep. Zeibright soils have coarse textures.		

PMG Putt-McCarthy-Zeibright complex, 30 to 75 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.		
Soil Map Unit Components	**Putt**	**McCarthy**	**Zeibright**
Proportion (percent)	30	25	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.	15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum		28 inches; weathered andesitic tuff breccia.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34	20 to 40	40 to 80
Available Water Capacity Class	Very low	Low	Very low to low
AWC for top 20”	0.9-1.1	2.3-2.6	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Moderately slow	Moderately rapid Rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Severe	Moderate	Severe to moderate
Revegetating Exposed Subsoil	Moderate	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170	 4 P, WF 120 to 170	 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4EPX	 IV 4Ep	 IV 4ep
Inclusions	Included in this unit are small areas of Crozier and Ledmount soils. Included areas make up about 30 percent of the total area.		
Management Considerations	Steep and vert steep slopes. High amounts of rock fragments. Putt soils are moderately deep to a root restricting pan. McCarthy soils are moderately deep. Zeibright soils have coarse textures.		

PTE Putt-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Alder/Willow series.		
Soil Map Unit Components	**Putt**	**Rock outcrop**	**Cryumbrepts, wet**
Proportion (percent)	40	20	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.		
Substratum			Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34		Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.9-1.1		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4ePX		 IV 4EW
Inclusions	Included in this unit are small areas of McCarthy, Tallac, Tinker, and Zeibright soils. Included areas make up about 20 percent of the total area.		
Management Considerations	Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential source of aggregate.		

PTG Putt-Rock outcrop-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Alder/Willow series.		
Soil Map Unit Components	**Putt**	**Rock outcrop**	**Cryumbrepts, wet**
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.		
Substratum			Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34		Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.9-1.1		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EPX		 IV 4EW
Inclusions	Included in this unit are small areas of McCarthy, Tallac, Tinker, and Zeibright soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential source of aggregate.		

PUE Putt-Zeibright complex, 2 to 30 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Putt**	**Zeibright**
Proportion (percent)	75	15

Soil Profile Description

Surface Layer	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.	21 to 62 inches; yellowish brown cobbly fine sandy loam; massive; strongly acid.
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 34	40 to 80
Available Water Capacity Class	Very low	Very low to low
AWC for top 20”	0.9-1.1	1.2-1.9
Permeability: Subsoil Substratum	Moderately apid Very slow	Moderately rapid Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Severe	Severe to moderate
Revegetating Exposed Subsoil	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170	 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4ePX	 IV 2ep
Inclusions	Included in this unit are small areas of Tallac and Tinker soils; soils similar to Putt but with a cambic horizon and without a large amount of rock fragments; and shallow soils with a duripan. Included areas make up about 10 percent of the total area.	
Management Considerations	High amounts of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures.	

PUF Putt-Zeibright complex, 30 to 50 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series.	
Soil Map Unit Components	**Putt**	**Zeibright**
Proportion (percent)	75	15

Soil Profile Description

Surface Layer	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.	21 to 62 inches; yellowish brown cobbly fine sandy loam; massive; strongly acid.
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 34	40 to 80
Available Water Capacity Class	Very low	Very low to low
AWC for top 20”	0.9-1.1	1.2-1.9
Permeability: Subsoil Substratum	Moderately apid Very slow	Moderately rapid Rapid
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Severe	Severe
Revegetating Exposed Subsoil	Moderate	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170	 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4EPX	 IV 4EP
Inclusions	Included in this unit are small areas of Tallac and Tinker soils; soils similar to Putt but with a cambic horizon and without a large amount of rock fragments; and shallow soils with a duripan. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. High amounts of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures.	

PVE Putt-Rock outcrop, granitic-Zeibright complex, 2 to 30 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Mixed brush series; Mixed conifer-Barren series.		
Soil Map Unit Components	**Putt**	**Rock outcrop**	**Zeibright**
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated granitic rock.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.		21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum			
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34		40 to 80
Available Water Capacity Class	Very low		Very low to low
AWC for top 20”	0.9-1.1		1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Rapid
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		Moderate
Seedling Mortality	Severe		Severe to moderate
Revegetating Exposed Subsoil	Moderate		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4ePX		 IV 2ep
Inclusions	Included in this unit are small areas of Tallac and Tinker soils; and soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.		
Management Considerations	High amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.		

PVG Putt-Rock outcrop, granitic-Zeibright complex, 30 to 75 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Mixed conifer-Mixed brush series; Mixed conifer-Barren series.

Soil Map Unit Components	Putt	Rock outcrop	Zeibright
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated granitic rock.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.		21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum			
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34		40 to 80
Available Water Capacity Class	Very low		Very low to low
AWC for top 20”	0.9-1.1		1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Rapid
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Severe		Severe to moderate
Revegetating Exposed Subsoil	Moderate		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4EPX		 IV 4Ep

Inclusions: Included in this unit are small areas of Tallac and Tinker soils; and shallow soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. High amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

PWE Putt-Rock outcrop, metamorphic-Zeibright complex, 2 to 30 percent slopes

Elevation: 3,600 to 5,500 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Barren series.		
Soil Map Unit Components	**Putt**	**Rock outcrop, metamorphic**	**Zeibright**
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated metamorphic rock.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.		21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum			
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 34	metmorphic	40 to 80
Available Water Capacity Class	Very low		Very low to low
AWC for top 20”	0.9-1.1		1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Rapid
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		Moderate
Seedling Mortality	Severe		Severe to moderate
Revegetating Exposed Subsoil	Moderate		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4ePX		 IV 2ep
Inclusions	Included in this unit are small areas of Deadwood soils and shallow soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.		
Management Considerations	High amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggregate.		

PWG Putt-Rock outcrop, metmorphic-Zeibright complex, 30 to 75 percent slopes

	Elevation: 3,600 to 5,500 feet	Annual Precipitation: 50 to 70 inches	
Typical Vegetation	Mixed conifer-Barren series.		
Soil Map Unit Components	**Putt**	**Rock outcrop, metmorphic**	**Zeibright**
Proportion (percent)	45	25	20
	Soil Profile Description		
Surface Layer	0 to 20 inches; dark grayish bown very cobbly sandy loam; moderate granular structure; slightly acid.	Glaciated metamorphic rock.	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	20 to 55 inches; pale yelllow very cobbly sandy loam; weakly cemented with silica.		21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum			
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 34	metamorphic	40 to 80
Available Water Capacity Class	Very low		Very low to low
AWC for top 20”	0.9-1.1		1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Rapid
Drainage Class	Well drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Severe		Severe to moderate
Revegetating Exposed Subsoil	Moderate		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 P, WF 120 to 170		 3 P, WF 50 to 240
Soil Manageability Group Class	 IV 4ePX		 IV 4ep
Inclusions	Included in this unit are small areas of Deadwood soils and shallow soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. High amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Zeibright soils have coarse textures. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggregate.		

PX Pits, borrow

Elevation: x feet Annual Precipitation: x inches

Typical Vegetation	Barren.
Soil Map Unit Components	**Pits, borrow**
Proportion (percent)	95

Soil Profile Description

Surface Layer	Excavation for gravel, cinders, decomposed granite, and sanitary landfills.
Subsoil	
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are small areas of unidentified soils. Included areas make up about 5 percent of the total area.
Management Considerations	Borrow pits are a potential source of aggregate. These lands need on-site investigations to determine if restoration is needed.

R Riverwash

Elevation: x feet | Annual Precipitation: x inches

Typical Vegetation	Barren with a few willows and carex.
Soil Map Unit Components	**Riverwash**
Proportion (percent)	95

Soil Profile Description

Surface Layer	Stony, cobbly, gravelly, or sandy stream and river deposits.
Subsoil	
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are small areas of Aquolls, Borolls, and Water. Included areas make up about 5 percent of the total area.
Management Considerations	Riverwash areas are a potential source of aggregate. They are subject to flooding.

RAG Rock outcrop-Franktown-Kyburz complex, 50 to 75 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 30 inches

Typical Vegetation: Barren-Mixed conifer series; Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit Components	Rock outcrop	Franktown	Kyburz
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	Volcanic rock.	0 to 15 inches; brown gravelly loam; moderate granular structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil			6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum		15 inches; weathered volcanic rock.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		15 to 20	20 to 40
Available Water Capacity Class		Very low	Low
AWC for top 20”		1.1-1.3	2.2-2.7
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately slow Moderately slow
Drainage Class		Well drained	Well drained
Max Erosion Hazard		Very high	High
Seedling Mortality		Severe	Slight
Revegetating Exposed Subsoil		Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 Not capable Not rated	 5,6 P Not rated
Soil Manageability Group Class		 IV 4Ep	 IV 4Ep

Inclusions: Included in this unit are small areas of Aldi, Fugawee, and Fugawee Variant soils and gullied land. Included areas make up about 30 percent of the total area.

Management Considerations: Very steep slopes. Relatively short growing season. Franktown soils are shallow to bedrock, have high amounts of rock fragments, reach field capacity rapidly, and can produce surface runoff. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RCG Rock outcrop-Chawanakee-Chaix complex, 50 to 75 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation: Barren-Mixed conifer series.

Soil Map Unit Components	Rock outcrop	Chawanakee	Chaix
Proportion (percent)	55	20	15
Soil Profile Description			
Surface Layer	Granitic rock.	0 to 5 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.	0 to 9 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.
Subsoil		5 to 15 inches; very pale brown coarse sandy loam; massive; strongly acid.	9 to 29 inches; very pale brown coarse sandy loam; weak subangular blocky structure; slightly acid.
Substratum		15 inches; highly weathered granodiorite.	29 inches; weathered grano-diorite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		12 to 20	20 to 40
Available Water Capacity Class		Very low	Very low to low
AWC for top 20”		1.2-2.0	1.6-2.6
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately rapid Moderately slow
Drainage Class		Somewhat excessively drained	Well drained
Max Erosion Hazard		Very high	High
Seedling Mortality		Severe	Severe to slight
Revegetating Exposed Subsoil		Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 7 P Not rated	 5 P Not rated
Soil Manageability Group Class		 IV 4Ep	 IV 4Ep

Inclusions: Included in this unit are small areas of Hotaw soils . Included areas make up about 10 percent of the total area.

Management Considerations: Very steep slopes. Chawanakee soils are shallow, have coarse textures, a thin surface layer, and a relatively low cation exchange capacity. These soils reach field capacity rapidly and can produce surface runoff. Chaix soils are moderately deep, have coarse textures, a thin surface layer, nd a relatively low cation exchange capacity. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RDE Rock outcrop-Dubakella-Dubakella Variant complex, 2 to 40 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation: Manzanita-Jeffrey pine series; Barren-Manzanita series.

Soil Map Unit Components	Rock outcrop	Dubakella	Dubakella Variant
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	Serpentinitic rock.	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.	0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid.
Subsoil		3 to 32 inches; yellowish red very cobbly clay loam; massive; mildly alkaline.	5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral.
Substratum		32 inches; serpentinitic bedrock.	13 inches; fractured serpentinitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		20 to 40	12 to 20
Available Water Capacity Class		Low	Very low
AWC for top 20”		2.3-2.6	1.3-1.6
Permeability: Subsoil Substratum		Slow Slow	Moderately slow Very slow
Drainage Class		Well drained	Well drained
Max Erosion Hazard		High	High
Seedling Mortality		Moderate	Severe
Revegetating Exposed Subsoil		Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5 P 70 to 120	 Not capable 20 to 80
Soil Manageability Group Class		 II 2ep	 II 2ep

Inclusions: Included in this unit are small areas of Forbes soils, soils similar to Dubakella but with a thick dark surface layer, and moderately deep loamy soils with a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Low fertility due to the serpentinitic nature of the parent material, thin surface layers, and a high amount of rock fragments. Dubakella soils are moderately deep and have a low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RDG Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes

Elevation: 2,500 to 4,500 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation: Manzanita-Jeffrey pine series; Barren-Manzanita series.

Soil Map Unit Components	Rock outcrop	Dubakella	Dubakella Variant
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	Serpentinitic rock.	0 to 3 inches; dark red loam; moderate granular structure; slightly acid.	0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid.
Subsoil		3 to 32 inches; yellowish red very cobbly clay loam; massive; mildly alkaline.	5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral.
Substratum		32 inches; serpentinitic bedrock.	13 inches; fractured serpentinitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		20 to 40	12 to 20
Available Water Capacity Class		Low	Very low
AWC for top 20”		2.3-2.6	1.3-1.6
Permeability: Subsoil Substratum		Slow Slow	Moderately slow Very slow
Drainage Class		Well drained	Well drained
Max Erosion Hazard		High	High
Seedling Mortality		Moderate	Severe
Revegetating Exposed Subsoil		Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5 P Not rated	 Not capable Not rated
Soil Manageability Group Class		 IV 4Ep	 IV 4Ep

Inclusions: Included in this unit are small areas of soils similar to Dubakella but with a thick dark surface layer, and moderately deep soils with a high amount of rock fragments, and shallow dark colored loamy soils with a high amount of rock fragments in the vicinity of Goodyears Bar to Poker Flat. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Low fertility due to the serpentinitic nature of the parent material, thin surface layers, and a high amount of rock fragments. Dubakella soils are moderately deep and have a low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RPE Rock outcrop, granitic-Putt complex, 2 to 30 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Barren-Mixed conifer series; Barren-Mixed brush series.	
Soil Map Unit Components	**Rock outcrop, granitic**	**Putt**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	Granitic rock.	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid.
Subsoil		20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.
Substratum		
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	granitic	20 to 34
Available Water Capacity Class		Very low
AWC for top 20”		0.9-1.1
Permeability: Subsoil Substratum		Moderately apid Very slow
Drainage Class		Well drained
Max Erosion Hazard		High
Seedling Mortality		Severe
Revegetating Exposed Subsoil		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4 P, WF 120 to 170
Soil Manageability Group Class		 IV 4ePX
Inclusions	Included in this unit are small areas of Zeibright soils; shallow loamy soils with a high amount of rock fragments; and areas where Rock outcrop is gabbro. Included areas make up about 15 percent of the total area.	
Management Considerations	Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.	

RPG Rock outcrop, granitic-Putt complex, 30 to 75 percent slopes

Elevation: 4,000 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Barren-Mixed conifer series; Barren-Mixed brush series.	
Soil Map Unit Components	**Rock outcrop, granitic**	**Putt**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	Granitic rock.	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid.
Subsoil		20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	granitic	20 to 34
Available Water Capacity Class		Very low
AWC for top 20”		0.9-1.1
Permeability: Subsoil Substratum		Moderately rapid Very slow
Drainage Class		Well drained
Max Erosion Hazard		High
Seedling Mortality		Severe
Revegetating Exposed Subsoil		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4 P 120 to 170
Soil Manageability Group Class		 IV 4EPX

Inclusions

Included in this unit are small areas of Zeibright soils; shallow loamy soils with a high amount of rock fragments; areas where Rock outcrop is gabbro; and soils similar to Zeibright but are sandy with high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations

Steep and very steep slopes. Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

RRG Rock outcrop, granitic-Tinker complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 50 to 80 inches

Typical Vegetation	Barren-Mixed conifer series; Barren-Red fir series.	
Soil Map Unit Components	**Rock outcrop, granitic**	**Tinker**
Proportion (percent)	60	20
Soil Profile Description		
Surface Layer	Granitic rock.	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.
Subsoil		21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.
Substratum		33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	granitic	22 to 40
Available Water Capacity Class		Very low
AWC for top 20”		1.4-1.6
Permeability: Subsoil Substratum		Moderately rapid Very slow
Drainage Class		Well drained
Max Erosion Hazard		High
Seedling Mortality		Severe to moderate
Revegetating Exposed Subsoil		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5 RF, LP 270 to 380
Soil Manageability Group Class		 IV 4Epx
Inclusions	Included in this unit are small areas of Smokey and Tallac soils; sandy soils similar to Tinker with high amounts of rock fragments; soils similar to Tinker but with a surface layer less than 20 inches thick. and shallow loamy soils with a high amount of rock fragments. Included areas make up about 20 percent of the total area.	
Management Considerations	Steep and very steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.	

RSE Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Barren-Red fir/Hemlock series.

Soil Map Unit Components	Rock outcrop, granitic	Tinker	Cryumbrepts, wet
Proportion (percent)	45	30	15
Soil Profile Description			
Surface Layer	Glaciated granitic rock.	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.	
Substratum		33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	granitic	22 to 40	Variable
Available Water Capacity Class		Very low	Very low
AWC for top 20”		1.4-1.6	
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately slow Very slow
Drainage Class		Well drained	Poorly drained
Max Erosion Hazard		High	Very high
Seedling Mortality		Severe to moderate	Severe
Revegetating Exposed Subsoil		Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5 RF, LP 270 to 380	 Not capable 170 to 640
Soil Manageability Group Class		 III 3epX	 III 4EW

Inclusions: Included in this unit are small areas of Tallac soils; soils similar to Tinker but with a surface layer less than 20 inches thick; and shallow loamy soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RSG Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Barren-Red fir/Hemlock series.

Soil Map Unit Components	Rock outcrop, granitic	Tinker	Cryumbrepts, wet
Proportion (percent)	55	25	10
Soil Profile Description			
Surface Layer	Glaciated granitic rock.	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil		21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.	
Substratum		33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	granitic	22 to 40	Variable
Available Water Capacity Class		Very low	Very low
AWC for top 20”		1.4-1.6	
Permeability: Subsoil Substratum		Moderately rapid Very slow	Moderately slow Very slow
Drainage Class		Well drained	Poorly drained
Max Erosion Hazard		High	Very high
Seedling Mortality		Severe to moderate	Severe
Revegetating Exposed Subsoil		Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 5 RF, LP 270 to 380	 Not capable 170 to 640
Soil Manageability Group Class		 IV 4EpX	 IV 4EW

Inclusions: Included in this unit are small areas of Tallac soils and shallow loamy soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RTG Rock outcrop-Toiyabe complex, 50 to 75 percent slopes

Elevation: 5,000 to 6,200 feet Annual Precipitation: 20 to 40 inches

Typical Vegetation	Mixed brush-Barren series; Barren-Mixed brush series.	
Soil Map Unit Components	**Rock outcrop**	**Toiyabe**
Proportion (percent)	55	35
Soil Profile Description		
Surface Layer	Granitic rock.	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; strongly acid.
Subsoil		8 to 16 inches; pale brown cobbly loamy coarse sand; single grained; strongly acid.
Substratum		16 inches; highly weathered granitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)		10 to 20
Available Water Capacity Class		Very low
AWC for top 20”		0.8-1.0
Permeability: Subsoil Substratum		Rapid Moderate
Drainage Class		Somewhat excessively drained
Max Erosion Hazard		Very high
Seedling Mortality		Severe
Revegetating Exposed Subsoil		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 6 P 60 to 120
Soil Manageability Group Class		 IV 4EP
Inclusions	Included in this unit are small areas of Tallac and Tinker soils. Included areas make up about 10 percent of the total area.	
Management Considerations	Very steep slopes. Toiyabe soils are sandy, have a thin surface, and a low cation exchange capacity. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.	

RUG Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation: Barren-Mixed brush series; Barren-Mixed conifer series.

Soil Map Unit Components	Rock outcrop	Woodseye Variant	Umpa
Proportion (percent)	40	35	15
Soil Profile Description			
Surface Layer	Volcanic rock.	0 to 14 inches; grayish brown very gravelly sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.
Subsoil			8 to 24 inches; pale bown very gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum		14 inches; hard volcanic rock.	24 inches; weathered coarse grained andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		12 to 20	20 to 40
Available Water Capacity Class		Very low	Very low
AWC for top 20”		0.6-1.0	1.2-1.9
Permeability: Subsoil Substratum		Moderately rapid Moderate	Moderately rapid Moderate
Drainage Class		Well drained	Well drained
Max Erosion Hazard		High	High
Seedling Mortality		Severe	Severe to moderate
Revegetating Exposed Subsoil		Severe	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 Not capable 60 to 160	 5 RF, WF 60 to 160
Soil Manageability Group Class		 IV 4EP	 IV 4EpX

Inclusions: Included in this unit are small areas of Meiss and Waca soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. High amounts of rock fragments. Woodseye Variant soils are shallow to hard bedrock and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff. Umpa soils are moderately deep, have coarse textures, a relatively low cation exchange capacity, and a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

RVE Rock outcrop-Waca, rhyolitic substratum-Ledmount Variant complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Barren-Mixed brush series; Barren-Red fir series.		
Soil Map Unit Components	**Rock outcrop**	**Waca, rhyolitic substratum**	**Ledmount Variant**
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	Rhyolitic rock bluffs.	0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.	0 to 19 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid.
Subsoil		14 to 32 inches;brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.	
Substratum		32 inches; weathered rhyolitic tuff.	19 inches; hard rhyolitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		20 to 40	11 to 19
Available Water Capacity Class		Low	Very low
AWC for top 20”		2.1-2.3	1.4-1.6
Permeability: Subsoil Substratum		Moderately rapid Moderately slow	Moderately rapid Slow
Drainage Class		Well drained	Well drained
Max Erosion Hazard		Moderate	Moderate
Seedling Mortality		Moderate to slight	Severe
Revegetating Exposed Subsoil		Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4,5 RF, WF 60 to 140	 Not capable 160 to 270
Soil Manageability Group Class		 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Ahart and Tinker soils; Included areas make up about 15 percent of the total area.		
Management Considerations	High amounts of rock fragments. Waca, rhyolitic substratum soils are moderately deep. Ledmount Variant soils are shallow to hardbedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

RWG Rock outcrop-Waca-Meiss association, 50 to 75 percent slopes

Elevation: 7,000 to 9,000 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation: Barren-Red fir series; Wyethia series.

Soil Map Unit Components	Rock outcrop	Waca	Meiss
Proportion (percent)	40	30	15
Soil Profile Description			
Surface Layer	Volcanic rock.	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.
Subsoil		12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum		32 inches; weathered andesitic tuff breccia.	19 inches; hard volcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)		20 to 40	12 to 20
Available Water Capacity Class		Low	Very low
AWC for top 20”		2.1-2.3	2.6-2.9
Permeability: Subsoil Substratum		Moderately rapid Slow	Moderately rapid Very slow
Drainage Class		Well drained	Somewhat excessively drained
Max Erosion Hazard		High	High
Seedling Mortality		Moderate to slight	Slight
Revegetating Exposed Subsoil		Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4,5 RF, WF Not rated	 Not capable Not rated
Soil Manageability Group Class		 IV 4Ep	 IV 4Ed

Inclusions: Included in this unit are small areas of gullied land. Included areas make up about 15 percent of the total area.

Management Considerations: Very steep slopes. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

SIE Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 40 inches

Typical Vegetation: Mixed conifer series.

Soil Map Unit Components	Sierraville	Trojan	Kyburz
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid.	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	0 to 6 inches;brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	9 to 75 inches;weak red clay; moderate angular blocky structure; medium acid.	10 to 67 inches;brown and light brown clay loam; moderate angular blocky structure; medium acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	75 inches; slightly weathered andesite.	67 inches; slightly fractured andesite.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	40 to 80	20 to 40
Available Water Capacity Class	Low to high	Low to moderate	Low
AWC for top 20”	2.4-2.8	1.8-2.5	2.2-2.7
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderately slow Moderately slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, WF 120 to 190	 4,5 P, WF 190 to 250	 5,6 P, WF 120 to 190
Soil Manageability Group Class	 III 3eX	 III 2ep	 III 2ep

Inclusions: Included in this unit are small areas of Sattley soils and Rock outcrop. Included areas make up about 10 percent of the total area.

Management Considerations: Relatively short growing season. Sierraville soils have surface stones and a subsoil with low strength when wet. Kyburz soils are moderately deep and have a thin surface layer.

SKE Sites-Jocal complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.	
Soil Map Unit Components	**Sites**	**Jocal**
Proportion (percent)	55	35

Soil Profile Description

Surface Layer	0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid.	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.
Subsoil	9 to 45 inches; yellowish red gravelly clay;strong subangular blocky structure; medium acid.	18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid.
Substratum	45 inches; weathered metasedimentary rock.	70 inches; weathered slate and shale.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 65	40 to 70
Available Water Capacity Class	Low to moderate	Low to high
AWC for top 20”	2.6-3.1	2.4-3.1
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	Moderate
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640
Soil Manageability Group Class	 II 2e	 II 2e
Inclusions	Included in this unit are small areas of Boomer and Mariposa soils and moderately deep loamy soils without a clay increase in the subsoil and with a high amount of rock fragments. Included areas make up about 10 percent of the total area.	
Management Considerations	Sites soils have a low subsoil strength when wet.	

SKE5 Sites-Jocal complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,000 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Grass series; Plantation.	
Soil Map Unit Components	**Sites, altered**	**Jocal, altered**
Proportion (percent)	55	40

Soil Profile Description

Surface Layer	0 to 4 inches; dark reddish brown loam; moderate granular structure; slightly acid.	0 to 9 inches; reddish brown loam; weak granular structure; slightly acid.
Subsoil	4 to 43 inches; reddish yellow cobbly clay; massive; medium acid.	9 to 50 inches; reddish brown gravelly clay loam; weak subangular blocky structure; medium acid.
Substratum	43 inches; weathered metasedimentary rock.	50 inches; weathered metasedimentary rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 65	40 to 70
Available Water Capacity Class	Low to moderate	Low to moderate
AWC for top 20”	2.7-3.3	2.2-3.0
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight to moderate
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4e	 IV 4e
Inclusions	Included in this unit are small areas of Mariposa. Included areas make up about 5 percent of the total area.	
Management Considerations	Surface soils have been disturbed. On-site investigations are needed to determine if corrective traetments are needed. Sites soils have a low subsoil strength when wet.	

SKF Sites-Jocal-Mariposa complex, 30 to 50 percent slopes

Elevation: 1,800 to 3,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Mixed hardwood series.

Soil Map Unit Components	Sites	Jocal	Mariposa
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid.	0 to 18 inches; reddish brown loam; weak granular structure; slightly acid.	0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral.
Subsoil	9 to 45 inches; yellowish red gravelly clay; strong subangular blocky structure; medium acid.	18 to 70 inches; reddish yellow brown silty clay loam; moderate angular blocky strucuture; strongly acid.	6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid.
Substratum	45 inches; weathered metasedimentary rock.	70 inches; weathered slate and shale.	33 inches; hard and semi-hard metesediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 65	40 to 70	15 to 33
Available Water Capacity Class	Low to moderate	Low to high	Low
AWC for top 20”	2.6-3.1	2.4-3.1	2.2-2.8
Permeability: Subsoil Substratum	Moderately slow to slow Slow	Moderately slow Moderately slow	Moderate Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate to slight	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 1,2 DF, P 240 to 640	 1,2 DF, P 240 to 640	 4,3 P, DF 120 to 170
Soil Manageability Group Class	 III 3E	 III 3E	 III 3Ep

Inclusions: Included in this unit are small areas of Boomer, Boomer Variant, and Hurlbut soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Sites soils have low subsoil strength when wet. Mariposa soils are shallow and modrately deep, and have a thin surface layer. They reach field capacity rapidly, and can produce surface runoff.

SME Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,200 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Mixed brush series.

Soil Map Unit Components	Smokey	Smokey Variant	Woodseye
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 4 inches;brown gravelly sandy loam; moderate granular structure; strongly acid.	0 to 3 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.	0 to 14 inches; very dark grayish brown gravelly sandy loam; weak granular structure; medium acid.
Subsoil	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	3 to 47 inches; yellowish brown very gravelly loam; weak subangular blocky structure; neutral.	14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid.
Substratum	24 inches; weathered metasedimentary rock.	47 inches; highly weathered metasedimentary rock.	19 inches; hard metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	40 to 60	9 to 20
Available Water Capacity Class	Very low	Very low to low	Very low
AWC for top 20”	1.3-1.8	1.3-1.7	0.6-0.9
Permeability: Subsoil Substratum	Moderate Slow	Moderate Slow	Moderate Slow
Drainage Class	Well drained	Well drained	Somewhat excessively drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate	Severe	Severe
Revegetating Exposed Subsoil	Moderate	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, RF 100 to 140	 4,5 RF 100 to 140	 Not capable 160 to 270
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 3eP

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Smokey but with clay loam textures; shallow soils similar to woodseye but with light colored surface layers; and soils similar to Woodseye but with a paralithic contact. Included areas make up about 15 percent of the total area.

Management Considerations: High amount of rock fragments. Smokey soils are moderately deep and have a thin surface layer. Woodseye soils are shallow to hard bedrock, have a thin surface layer, they reach field capacity rapidly, and can produce surface runoff.

SMG Smokey-Woodseye-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,200 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Mixed brush series; Red fir-Mixed brush series.

Soil Map Unit Components	Smokey	Woodseye	Rock outcrop
Proportion (percent)	45	20	10
Soil Profile Description			
Surface Layer	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid.	Metasedimentary rock.
Subsoil	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	14 to 19 inches; light yellowish brown exteremely gravelly loam; massive; slightly acid.	
Substratum	24 inches; weathered metasedimentary rock.	19 inches; weathered slate and shale.	
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	9 to 20	
Available Water Capacity Class	Very low	Very low	
AWC for top 20”	1.3-1.8	0.6-0.9	
Permeability: Subsoil Substratum	Moderate Slow	Moderate Slow	
Drainage Class	Well drained	Somewhat excessively drained	
Max Erosion Hazard	High	High	
Seedling Mortality	Moderate	Severe	
Revegetating Exposed Subsoil	Moderate	Severe	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, 5 P 100 to 140	 Not capable 160 to 270	
Soil Manageability Group Class	 IV 4Ep	 IV 4EP	

Inclusions: Included in this unit are small areas of Smokey Variant soils; soils similar to Smokey but with clay loam textures; in the Ladies Canyon area, soils similar to Smokey but with a clay accumulation in the subsoil; Cryumbrepts, wet; soils similar to Smokey but with redder colors in the subsoil; and shallow soils similar to Woodseye but with a light colored surface layer. Included areas make up about 25 percent of the total area.

Management Considerations: Steep and very steep slopes. These soils have a thin surface layer and a high amount of rock fragments. Smokey soils are moderately deep.Sites soils have low subsoil strength when wet. Mariposa soils are shallow and modrately deep, and have a thin surface layer. They reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion from adjacent soils. Rock outcrop areas are a potential source of aggregate.

SOE Smokey-Lorack-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Mixed conifer-Mixed brush series; Red fir-Mixed brush series.

Soil Map Unit Components	Smokey	Lorack	Cryumbrepts, wet
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	8 to 56 inches; yellowish brown extremely gravelly loam; weak subangular blocky structure; strongly acid.	
Substratum	24 inches; weathered metasedimentary rock.	56 to 75 inches; extremely gravelly sandy loam; weakly cemented; extremely acid.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	45 to 75	Variable
Available Water Capacity Class	Very low	Very low to low	Very low
AWC for top 20”	1.3-1.8	1.0-1.4	
Permeability: Subsoil Substratum	Moderate Slow	Moderate Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate	Severe to moderate	Severe
Revegetating Exposed Subsoil	Moderate	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF 100 to 140	 2,3 RF 140 to 220	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 4EW

Inclusions: Included in this unit are small areas of Tinker and Woodseye soils; and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: These soils have a high amount of rock fragments. Smokey soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

SOF Smokey-Lorack-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Mixed conifer-Mixed brush series; Red fir-Mixed brush series.

Soil Map Unit Components	Smokey	Lorack	Cryumbrepts, wet
Proportion (percent)	50	20	15
Soil Profile Description			
Surface Layer	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.	8 to 56 inches; yellowish brown extremely gravelly loam; weak subangular blocky structure; strongly acid.	
Substratum	24 inches; weathered metasedimentary rock.	56 to 75 inches; extremely gravelly sandy loam; weakly cemented; extremely acid.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	45 to 75	Variable
Available Water Capacity Class	Very low	Very low to low	Very low
AWC for top 20”	1.3-1.8	1.0-1.4	
Permeability: Subsoil Substratum	Moderate Slow	Moderate Moderately slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate	Severe to moderate	Severe
Revegetating Exposed Subsoil	Moderate	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF 100 to 140	 2,3 RF 140 to 220	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EW

Inclusions: Included in this unit are small areas of Tinker and Woodseye soils, and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. These soils have a high amount of rock fragments. Smokey soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

SPG Smokey-Rock outcrop, metamorphic-Rubble land complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,000 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation	Mixed brush-Mixed conifer series; Mixed brush-Barren series; Mixed brush-Red fir series.		
Soil Map Unit Components	**Smokey**	**Rock outcrop, metamorphic**	**Rubble land**
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.	Metamorphic rock.	Angular stones and cobbles with some soil material between rock fragments.
Subsoil	4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.		
Substratum	24 inches; weathered metasedimentary rock.		
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	metamorphic	
Available Water Capacity Class	Very low		
AWC for top 20”	1.3-1.8		
Permeability: Subsoil Substratum	Moderate Slow		
Drainage Class	Well drained		
Max Erosion Hazard	High		
Seedling Mortality	Moderate		
Revegetating Exposed Subsoil	Moderate		
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF 100 to 140		
Soil Manageability Group Class	 IV 4Ep		
Inclusions	Included in this unit are small areas of Lorack and Woodseye soils. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. Smokey soils are moderately deep, have a high amount of rock fragments, and a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rubble land areas have a potential for raveling. Rubble land and Rock outcrop areas are a potential source of aggregate.		

STE Rubble land-Jorge complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Barren-Red fir series; Barren-Mixed conifer series..	
Soil Map Unit Components	**Rubble land**	**Jorge**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	Angular stones and cobbles with some soil material between rock fragments.	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil		13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.
Substratum		41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)		40 to 60
Available Water Capacity Class		Very low to low
AWC for top 20”		1.7-1.8
Permeability: Subsoil Substratum		Moderate Moderate
Drainage Class		Well drained
Max Erosion Hazard		High
Seedling Mortality		Moderate
Revegetating Exposed Subsoil		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4 RF, WF 100 to 140
Soil Manageability Group Class		 II 2p
Inclusions	Included in this unit are small areas of Fugawee soils and Rock outcrop. Included areas make up about 10 percent of the total area.	
Management Considerations	Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate.	

STG Rubble land-Jorge complex, 30 to 75 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Barren-Red fir series; Barren-Mixed conifer series..	
Soil Map Unit Components	**Rubble land**	**Jorge**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	Angular stones and cobbles with some soil material between rock fragments.	0 to 13 inches; brown sandy loam; weak granular structure; slightly acid.
Subsoil		13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid.
Substratum		41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)		40 to 60
Available Water Capacity Class		Very low to low
AWC for top 20”		1.7-1.8
Permeability: Subsoil Substratum		Moderate Moderate
Drainage Class		Well drained
Max Erosion Hazard		High
Seedling Mortality		Moderate
Revegetating Exposed Subsoil		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)		 4 RF, WF 100 to 140
Soil Manageability Group Class		 IV 4ep
Inclusions	Included in this unit are small areas of Fugawee soils and Rock outcrop. Included areas make up about 15 percent of the total area.	
Management Considerations	Steep and very steep slopes. Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate. Areas of Rubble land have a potential for raveling.	

SUG Rubble land-Rock outcrop complex

Elevation: 6,000 to 9,000 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation	Barren-Mixed conifer series..	
Soil Map Unit Components	**Rubble land**	**Rock outcrop**
Proportion (percent)	65	30

Soil Profile Description

Surface Layer	Angular stones and cobbles with some soil material between rock fragments.	Volcanic rock.
Subsoil		
Substratum		

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are small areas of Jorge soils. Included areas make up about 5 percent of the total area.
Management Considerations	Steep and very steep slopes (30 to 75 percent). Areas of Rubble land areas are a potential source of aggregate and have a potential for raveling. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Areas of Rock outcrop are a potential source of aggregate.

TAE Tallac very gravelly sandy loam complex, 2 to 30 percent slopes

Elevation: 5,500 to 9,000 feet Annual Precipitation: 40 to 80 inches

Typical Vegetation	Mixed conifer series; Red fir series.
Soil Map Unit Components	**Tallac very gravelly sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid.
Subsoil	22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid.
Substratum	41 inches; light yellowish brown weakly cemented till.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low
AWC for top 20”	0.9-1.4
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Moderately well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 3eP
Inclusions	Included in this unit are small areas of Celio and Tinker soils; soils similar to Tallac with a surface layer less than 20 inches thick; soils similar to Tallac but without high amounts of rock fragments; and soils that are deep, loamy, and have thin or light colored surface layers. Included areas make up about 15 percent of the total area.
Management Considerations	Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity.

TAF Tallac very gravelly sandy loam complex, 30 to 50 percent slopes

Elevation: 5,500 to 9,000 feet Annual Precipitation: 40 to 80 inches

Typical Vegetation	Mixed conifer series; Red fir series.
Soil Map Unit Components	**Tallac very gravelly sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid.
Subsoil	22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid.
Substratum	41 inches; light yellowish brown weakly cemented till.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 60
Available Water Capacity Class	Very low
AWC for top 20”	0.9-1.4
Permeability: Subsoil Substratum	Moderately rapid Very slow
Drainage Class	Moderately well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 3eP
Inclusions	Included in this unit are small areas of Tinker, Waca, and Windy soils; soils similar to Tallac with a surface layer less than 20 inches thick; soils similar to Tallac but without high amounts of rock fragments; and soils that are deep, loamy, and have thin or light colored surface layers. Included areas make up about 15 percent of the total area.
Management Considerations	Steep slopes. Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity.

TBE Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,500 feet Annual Precipitation: 40 to 80 inches

Typical Vegetation	Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.	
Soil Map Unit Components	**Tallac**	**Cryumbrepts, wet**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid.	
Substratum	41 inches; light yellowish brown weakly cemented till.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	Variable
Available Water Capacity Class	Very low	Very low
AWC for top 20”	0.9-1.4	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Very slow
Drainage Class	Moderately well drained	Poorly drained
Max Erosion Hazard	High	Very high
Seedling Mortality	Severe to moderate	Severe
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180	 Not capable 170 to 640
Soil Manageability Group Class	 III 3eP	 III 4EW
Inclusions	Included in this unit are small areas of Celio, Tinker, Waca, and Windy soils; sandy soils similar to Tallac; soils similar to Tallac but with cemented till above 20 inches; and soils similar to Tallac but without high amounts of rock fragments. Included areas make up about 15 percent of the total area.	
Management Considerations	Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.	

TBF Tallac-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,500 feet Annual Precipitation: 40 to 80 inches

Typical Vegetation	Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.	
Soil Map Unit Components	**Tallac**	**Cryumbrepts, wet**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid.	
Substratum	41 inches; light yellowish brown weakly cemented till.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	40 to 60	Variable
Available Water Capacity Class	Very low	Very low
AWC for top 20”	0.9-1.4	
Permeability: Subsoil Substratum	Moderately rapid Very slow	Moderately rapid Very slow
Drainage Class	Moderately well drained	Poorly drained
Max Erosion Hazard	High	Very high
Seedling Mortality	Severe to moderate	Severe
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,4 RF, WF 100 to 180	 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EP	 IV 4EW
Inclusions	Included in this unit are small areas of Tinker, Waca, and Windy soils; shallow soils with a high amount of rock fragments over hard granite rock; and soils similar to Tallac but without high amounts of rock fragments. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes.Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.	

THF Tallac-Gullied land-Cryumbrepts, wet complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation	Red fir-Alder/Willow series; Red fir/Hemlock-Alder/Willow series.		
Soil Map Unit Components	**Tallac**	**Gullied land**	**Cryumbrepts, wet**
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid.	A network of mderately deep to deep V-shaped channels. Many have eroded down to bedrock, Erosion may be active.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid.		
Substratum	41 inches; light yellowish brown weakly cemented till.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60		Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.9-1.4		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Moderate well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 180		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EP		 IV 4EW
Inclusions	Included in this unit are small areas of Meiss, Tinker, and Waca soils, and Rock outcrop. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep and very steep slopes. Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capcity. Areas of Gullied land produce concentrated surface runoff which can increase the erosion on adjacent soils and they need on-site investigations to determine if restoration is needed. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.		

TIE Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes

	Elevation: 6,000 to 8,600 feet Annual Precipitation: 70 to 80 inches		
Typical Vegetation	Mixed conifer-Mixed brush series; Lodgepole-Alder/Meadow series; Red fir-Mixed brush series.		
Soil Map Unit Components	**Tinker**	**Rock outcrop, granitic**	**Cryumbrepts, wet**
Proportion (percent)	40	15	15
	Soil Profile Description		
Surface Layer	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.		
Substratum	33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
	Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	22 to 40	granitic	Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	1.4-1.6		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 RF, LP 270 to 380		 Not capable 170 to 640
Soil Manageability Group Class	 III 3epX		 III 4EW
Inclusions	Included in this unit are small areas of Tallac soils; sandy soils similar to Tallac with high amounts of rock fragments; soils similar to Tinker but with a thin surface layer; shallow or moderately deep soils similar to Tinker; and soils similar to Tinker but with a thinner surface layer with less than 50 percent base saturation. Included areas make up about 30 percent of the total area.		
Management Considerations	Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Areas of granitic Rock outcrop can produce concentrated surface runoff that can increase the erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.		

TIG Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 70 to 80 inches

Typical Vegetation: Mixed conifer-Mixed brush series; Lodgepole-Alder/Meadow series; Red fir-Mixed brush series.

Soil Map Unit Components	Tinker	Rock outcrop, granitic	Cryumbrepts, wet
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Granitic rock.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid.		
Substratum	33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	22 to 40	granitic	Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	1.4-1.6		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 RF, LP 270 to 380		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EpX		 IV 4EW

Inclusions: Included in this unit are small areas of Celio and Tallac soils; sandy soils similar to Tallac with high amounts of rock fragments; soils similar to Tinker but with a thin surface layer; shallow or moderately deep soils similar to Tinker; and soils similar to Tinker but with a thinner surface layer with less than 50 percent base saturation. Included areas make up about 30 percent of the total area.

Management Considerations: Steep and very steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Areas of granitic Rock outcrop can produce concentrated surface runoff that can increase the erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

TPG3 Toiyabe-Rock outcrop-Haypress complex, 30 to 75 percent slopes, severely eroded

Elevation: 6,000 to 7,000 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation	Jeffrey/Ponderosa-Mahogany series.		
Soil Map Unit Components	**Toiyabe**	**Rock outcrop**	**Haypress**
Proportion (percent)	50	25	15
Soil Profile Description			
Surface Layer	0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid.	Granitic rock.	0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid.
Subsoil	8 to 16 inches; pale brown cobbly loam coarse sand; single grained; strongly acid.		14 to 49 inches; pale brown loamy coarse sand; massive; medium acid.
Substratum	16 inches; highly weathered granitic rock.		49 inches; weathered granitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	10 to 20		40 to 60
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.7-0.8		1.2-1.6
Permeability: Subsoil Substratum	Rapid Moderate		Rapid Slow
Drainage Class	Somewhat excessively drained		Excessively drained
Max Erosion Hazard	Very high		Very high
Seedling Mortality	Severe		Severe to moderate
Revegetating Exposed Subsoil	Severe		Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable Not rated		 Not rated Not rated
Soil Manageability Group Class	 IV 4EP		 IV 4Ep
Inclusions	Included in this unit are small areas of moderately deep soils similar to Haypress. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep and very steep slopes. On-site investigations are needed to determine if corrective treatment is needed. Sandy soils and a relatively low cation exchange capacity. Toiyabe soils have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

TTE Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 40 inches

Typical Vegetation: Mixed conifer series.

Soil Map Unit Components	Trojan	Sattley	Kyburz
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structue; slightly acid.
Subsoil	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.	15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	67 inches; slightly fractured andesite.	46 inches; cemented andesitic conglomerate.	34 inches; weatherd andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	40 to 60	20 to 40
Available Water Capacity Class	Low to moderate	Very low to low	Low
AWC for top 20”	1.8-2.5	1.5-2.1	2.2-2.7
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderate	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate	Moderate
Seedling Mortality	Moderate to slight	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, WF 190 to 250	 4,5 P, WF 120 to 190	 5,6 P, WF 120 to 190
Soil Manageability Group Class	 II 2ep	 II 3epX	 II 2ep

Inclusions: Included in this unit are small areas of Rock outcrop soils; soils similar to Sattley and Trojan but without a thick dark surface layer; and soils similar to Sattley and Trojan but without a clay increase in the subsoil. Included areas make up about 30 percent of the total area.

Management Considerations: Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Kyburz soils are moderately deep and have a thin surface layer.

TTF Trojan-Sattley-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 40 inches

Typical Vegetation: Mixed conifer series.

Soil Map Unit Components	Trojan	Sattley	Kyburz
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structue; slightly acid.
Subsoil	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.	15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	67 inches; slightly fractured andesite.	46 inches; cemented andesitic conglomerate.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	40 to 60	20 to 40
Available Water Capacity Class	Low to moderate	Very low to low	Low
AWC for top 20”	1.8-2.5	1.5-2.1	2.2-2.7
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderate	Moderately slow Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Moderate to slight	Moderate	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, WF 190 to 250	 4,5 P, WF 120 to 190	 5,6 P, WF 120 to 190
Soil Manageability Group Class	 III 3Ep	 III 4EpX	 III 3Ep

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Sattley and Trojan but without a thick dark surface layer; and soils similar to Sattley and Trojan but without a clay increase in the subsoil. Included areas make up about 30 percent of the total area.

Management Considerations: Steep slopes. Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Kyburz soils are moderately deep and have a thin surface layer.

TUE Trojan-Sattley-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 40 inches

Typical Vegetation: Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Trojan	Sattley	Cryumbrepts, wet
Proportion (percent)	25	25	20
Soil Profile Description			
Surface Layer	0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.	0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.	15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid.	
Substratum	67 inches; slightly fractured andesite.	46 inches; cemented andesitic conglomerate.	Stratified loam to clay loam with dark colored mttles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	40 to 60	Variable
Available Water Capacity Class	Low to moderate	Very low to low	Very low
AWC for top 20”	1.8-2.5	1.5-2.1	
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderate	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	Moderate	Moderate	Very high
Seedling Mortality	Moderate to slight	Moderate	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 P, WF 190 to 250	 4,5 P, WF 120 to 190	 Not capable 170 to 640
Soil Manageability Group Class	 III 2ep	 III 3epX	 III 4EW

Inclusions: Included in this unit are small areas of Kyburz soils; Rock outcrop; soils similar to Sattley and Trojan but without a thick dark surface layer; and slopes steeper than 30 percent. Included areas make up about 30 percent of the total area.

Management Considerations: Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

TWE Rouen Variant-Aspen Variant-Sierraville complex, 2 to 30 percent slopes

Elevation: 5,200 to 7,800 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series.

Soil Map Unit Components	Rouen Variant	Aspen Variant	Sierraville
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown silt loam; moderate granular structure; neutral.	0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline.	0 to 9 inches; reddish brown stony sandy loam; moderate granular structue; slightly acid.
Subsoil	12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid.	18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid.	9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid.
Substratum		40 inches; weathered metavolcanic rock.	75 inches; slightly weathered andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	40 to 60	40 to 51
Available Water Capacity Class	Low to moderate	Very low to low	Low to high
AWC for top 20”	2.4-3.2	1.7-2.4	2.4-2.8
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderate	Moderately slow Moderate
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	High
Seedling Mortality	Slight	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 5 P 120 to 190	 5P 120 to 190
Soil Manageability Group Class	 II 2ep	 II 2ep	 II 3eX

Inclusions: Included in this unit are small areas of Kyburz, Sattley, and Trojan soils, and shallow soils. Included areas make up about 15 percent of the total area.

Management Considerations: Short growing season. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

TWF Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes

Elevation: 5,200 to 7,800 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series.

Soil Map Unit Components	Rouen Variant	Aspen Variant	Sierraville
Proportion (percent)	35	35	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown silt loam; moderate granular structure; neutral.	0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline.	0 to 9 inches; reddish brown stony sandy loam; moderate granular structue; slightly acid.
Subsoil	12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid.	18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid.	9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid.
Substratum		40 inches; weathered metavolcanic rock.	75 inches; slightly weathered andesite.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	40 to 60	40 to 51
Available Water Capacity Class	Low to moderate	Very low to low	Low to high
AWC for top 20”	2.4-3.2	1.7-2.4	2.4-2.8
Permeability: Subsoil Substratum	Moderately slow Moderately slow	Moderate Moderate	Moderately slow Moderate
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	Moderate	High	High
Seedling Mortality	Slight	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 5 P 120 to 190	 5 P 120 to 190
Soil Manageability Group Class	 III 3Ep	 III 3Ep	 III 4EX

Inclusions: Included in this unit are small areas of Kyburz, Sattley, and Trojan soils, Rock outcrop, and shallow soils. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Short growing season. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

TWF6 Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced

Elevation: 6,000 to 7,800 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series.

Soil Map Unit Components	Rouen Variant, terraced	Aspen Variant, terraced	Sierraville, terraced
Proportion (percent)	35	35	15
Soil Profile Description			
Surface Layer	0 to 6 inches; brown silt loam; moderate granular structure; neutral.	0 to 20 inches; brown very cobbly sandy loam; weak granular structure; neutral.	0 to 6 inches; yellowish brown gravelly loam; moderate granular structue; slightly acid.
Subsoil	6 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid.	20 to 42 inches; pale brown very cobbly fine sandy loam; massive slightly acid.	6 to 45 inches; light yellowish brown gravelly clay; massive; medium acid.
Substratum		42 inches; weathered metavolcanic rock-Gabbro.	45 inches; weathered metavolcanic rock-Gabbro.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	40 to 60	40 to 51
Available Water Capacity Class	Low to moderate	Very low to low	Low to moderate
AWC for top 20”	2.4-3.2	1.7-2.4	2.4-3.0
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Moderate	Moderately slow Moderate
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Moderate to severe	Slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated Not rated	 Not rated Not rated	 Not rated Not rated
Soil Manageability Group Class	 IV 4ep	 IV 4ep	 IV 4eX

Inclusions: Included in this unit are small areas of Kyburz, Rock outcrop, and shallow soils. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Short growing season. These areas have been terraced and on-site investigations are necessary to determine if corrective treatment is needed. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

TXE Rouen Variant-Cryumbrept, wet-Aspen Variant complex, 2 to 30 percent slopes

Elevation: 5,200 to 7,800 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Ceanothus-Mixed conifer series; Mixed conifer-Ceanothus series.

Soil Map Unit Components	Rouen Variant	Cryumbrepts, wet	Aspen Variant
Proportion (percent)	35	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; brown silt loam; moderate granular structure; neutral.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.	0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline.
Subsoil	12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid.		18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid.
Substratum		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.	40 inches; weathered metavolcanic rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 60	Variable	40 to 60
Available Water Capacity Class	Low to moderate	Very low	Very low to low
AWC for top 20”	2.4-3.2		1.7-2.4
Permeability: Subsoil Substratum	Moderate Moderate	Moderately rapid Very slow	Moderately rapid Moderate
Drainage Class	Well drained	Poorly drained	Well drained
Max Erosion Hazard	Moderate	Very high	High
Seedling Mortality	Slight	Severe	Moderate to slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190	 Not capable 170 to 640	 5 P 120 to 190
Soil Manageability Group Class	 III 2ep	 III 4EW	 III 2ep

Inclusions: Included in this unit are small areas of Kyburz and Sierraville soils, Rock outcrop, and shallow soils. Included areas make up about 30 percent of the total area.

Management Considerations: Short growing season. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and high amount of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

ULC Kyburz loam, 2 to 9 percent slopes

Elevation: 5,800 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.
Soil Map Unit Components	**Kyburz loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 5 inches; brown loam; moderate granular structure; neutral.
Subsoil	5 to 26 inches; brown clay loam; massive; slightly acid.
Substratum	26 inches; weathered andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Low
AWC for top 20”	2.2-2.7
Permeability: Subsoil Substratum	Moderately slow Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 P 120 to 190
Soil Manageability Group Class	 II 2p
Inclusions	Included in this unit are small areas of shallow soils. Included areas make up about 15 percent of the total area.
Management Considerations	Kyburz soils are moderately deep, have a thin surface layer, and a relatively short growing season.

UME Umpa stony sandy loam, 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 40 to 45 inches

Typical Vegetation	Red fir series; Red fir-Wyethia series; Mixed conifer series; Mixed conifer-Ceanothus series.
Soil Map Unit Components	**Umpa stony sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.
Subsoil	8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	24 inches; weathered coarse grained andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Very low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Moderate
Drainage Class	Well drained
Max Erosion Hazard	Moderate
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 160
Soil Manageability Group Class	 III 3eX
Inclusions	Included in this unit are small areas of Jorge, Tahoma, and Waca soils; Rock outcrop; and deep soils similar to Umpa but with less than 50 percent base saturation in the surface layer. Included areas make up about 15 percent of the total area.
Management Considerations	Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer.

UMF Umpa stony sandy loam, 30 to 50 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 40 to 45 inches

Typical Vegetation	Red fir series; Red fir-Wyethia series; Mixed conifer series; Mixed conifer-Ceanothus series.
Soil Map Unit Components	**Umpa stony sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.
Subsoil	8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid.
Substratum	24 inches; weathered coarse grained andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Very low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 160
Soil Manageability Group Class	 IV 4EX
Inclusions	Included in this unit are small areas of Jorge, Tahoma, and Waca soils; Rock outcrop; and deep soils similar to Umpa but with less than 50 percent base saturation in the surface layer. Included areas make up about 15 percent of the total area.
Management Considerations	Steep slopes. Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer.

UNE Umpa-Cryumbrepts, wet 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 40 to 45 inches

Typical Vegetation	Red fir series; Red fir-Wyethia series; Mixed conifer series; Mixed conifer-Ceanothus series.	
Soil Map Unit Components	**Umpa**	**Cryumbrepts, wet**
Proportion (percent)	70	15
Soil Profile Description		
Surface Layer	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	24 inches; weathered coarse grained andesite.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	Variable
Available Water Capacity Class	Very low	Very low
AWC for top 20”	1.2-1.9	
Permeability: Subsoil Substratum	Moderately rapid Moderate	Moderately rapid Moderate
Drainage Class	Well drained	Poorly drained
Max Erosion Hazard	Moderate	Very high
Seedling Mortality	Severe to moderate	Severe
Revegetating Exposed Subsoil	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 160	 Not capable 170 to 640
Soil Manageability Group Class	 III 3eX	 III 4EW
Inclusions	Included in this unit are small areas of Jorge, Umpa Variant, and Waca soils, and Rock outcrop. Included areas make up about 15 percent of the total area.	
Management Considerations	Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.	

UOE Umpa-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 40 to 45 inches

Typical Vegetation	Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series; Red fir-Ceanothus series.	
Soil Map Unit Components	**Umpa**	**Rock outcrop**
Proportion (percent)	60	20

Soil Profile Description

Surface Layer	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.	Coarse grained vescicular basalt.
Subsoil	8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	24 inches; weathered coarse grained andesite.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Very low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 160
Soil Manageability Group Class	 III 3eX
Inclusions	Included in this unit are small areas of Umpa Variant and Waca soils. Included areas make up about 15 percent of the total area.
Management Considerations	Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

UOG Umpa-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 7,000 to 8,500 feet Annual Precipitation: 40 to 45 inches

Typical Vegetation	Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series; Red fir-Ceanothus series.	
Soil Map Unit Components	**Umpa**	**Rock outcrop**
Proportion (percent)	60	25

Soil Profile Description

Surface Layer	0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid.	Coarse grained vescicular basalt.
Subsoil	8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	24 inches; weathered coarse grained andesite.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Very low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Moderate
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 160
Soil Manageability Group Class	 IV 4EX
Inclusions	Included in this unit are small areas of Umpa Variant and Waca soils. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

VRG Rock outcrop, volcanic

Elevation: 4,000 to 9,500 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Barren.
Soil Map Unit Components	**Rock outcrop, volcanic**
Proportion (percent)	90

Soil Profile Description

Surface Layer	Exposures of tuff-breccia, andesite, or basalt.
Subsoil	
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	volcanic
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are small areas of Fugawee, Ledmount, Meiss, McCarthy, Umpa Variant and Waca soils, and soils similar to Windy but with a thin suface layer. Included areas make up about 10 percent of the total area.
Management Considerations	Steep and very steep slopes (30 to 75 percent). Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Volcanic Rock outcrop areas are a potential source of aggregate.

W Water

Elevation: Variable feet Annual Precipitation: Variable inches

Typical Vegetation	None.
Soil Map Unit Components	**Ponds and lakes**
Proportion (percent)	100

Soil Profile Description

Surface Layer	
Subsoil	
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	
Available Water Capacity Class	
AWC for top 20”	
Permeability: Subsoil Substratum	
Drainage Class	
Max Erosion Hazard	
Seedling Mortality	
Revegetating Exposed Subsoil	
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	
Soil Manageability Group Class	
Inclusions	Included in this unit are occaissional islands.
Management Considerations	Not rated.

WAE Waca-Windy complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir series.	
Soil Map Unit Components	**Waca**	**Windy**
Proportion (percent)	60	30

Soil Profile Description

Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid.
Substratum	32 inches; weathered andesitic tuff breccia.	46 inches; weathered andesitic tuff breccia.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 60
Available Water Capacity Class	Low	Low
AWC for top 20”	2.1-2.3	2.2-2.6
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	Moderate	Moderate
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 160	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of metamorphic Rock outcrop; glacial soils with high amounts of rock fragments; similar soils with thin surface layers; sandy soils similar to Waca; moderately deep soils with a thin surface layer and a loamy subsoil; and deep and moderately deep soils developed from metamorphic rock in the Royal Gorge area. Included areas make up about 10 percent of the total area.	
Management Considerations	A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum.	

WAF Waca-Windy complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir series.	
Soil Map Unit Components	**Waca**	**Windy**
Proportion (percent)	65	25

Soil Profile Description

Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid.
Substratum	32 inches; weathered andesitic tuff breccia.	46 inches; weathered andesitic tuff breccia.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	40 to 60
Available Water Capacity Class	Low	Low
AWC for top 20”	2.1-2.3	2.2-2.6
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Slow
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 160	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Meiss and Tallac soils; similar soils with thin surface layers; sandy soils similar to Waca; similar soils without high amounts of rock fragments; and deep and moderately deep soils developed from metamorphic rock in the Royal Gorge area. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum.	

WBE Waca-Cryumbrepts, wet-Windy complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir-Alder/Willow series.		
Soil Map Unit Components	**Waca**	**Cryumbrepts, wet**	**Windy**
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.	0 to 6 inches; dark brown gravelly sandy loam; weak granular structue; slightly acid.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.		6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid.
Substratum	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.	46 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	Variable	40 to 60
Available Water Capacity Class	Low	Very low	Low
AWC for top 20”	2.1-2.3		2.2-2.6
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow	Moderately rapid Slow
Drainage Class	Well drained	Poorly drained	Well drained
Max Erosion Hazard	Moderate	Very high	Moderate
Seedling Mortality	Moderate to slight	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 140	 Not capable 170 to 190	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 2ep	 III 4EW	 III 2ep
Inclusions	Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.		
Management Considerations	A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.		

WBF Waca-Cryumbrepts, wet-Windy complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Red fir-Alder/Willow series.

Soil Map Unit Components	Waca	Cryumbrepts, wet	Windy
Proportion (percent)	40	25	20
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.	0 to 6 inches; dark brown gravelly sandy loam; weak granular structue; slightly acid.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.		6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid.
Substratum	32 inches; weathered andesitic tuff breccia.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.	46 inches; weathered andesitic tuff breccia.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	Variable	40 to 60
Available Water Capacity Class	Low	Very low	Low
AWC for top 20”	2.1-2.3		2.2-2.6
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow	Moderately rapid Slow
Drainage Class	Well drained	Poorly drained	Well drained
Max Erosion Hazard	High	Very high	High
Seedling Mortality	Moderate to slight	Severe	Slight
Revegetating Exposed Subsoil	Slight	Severe	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 140	 Not capable 170 to 190	 3,4 RF, WF 100 to 180
Soil Manageability Group Class	 III 3Ep	 III 4EW	 III 3Ep

Inclusions: Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

WCF Waca-Gullied land-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,500 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir-Barren series; Red fir-Alder/Willow series.		
Soil Map Unit Components	**Waca**	**Gullied land**	**Cryumbrepts, wet**
Proportion (percent)	55	15	15
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	A network of moderately deep to deep V-shaped channels. Many have eroded down to bedrock. Erosion may de active.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.		
Substratum	32 inches; weathered andesitic tuff breccia.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40		Variable
Available Water Capacity Class	Low		Very low
AWC for top 20”	2.1-2.3		
Permeability: Subsoil Substratum	Moderately rapid Slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	Moderate		Very high
Seedling Mortality	Moderate to slight		Severe
Revegetating Exposed Subsoil	Slight		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 140		 Not capable 170 to 190
Soil Manageability Group Class	 III 2ep		 III 4EW
Inclusions	Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; Rock outcrop; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep slopes. Waca soils are moderately deep, have a high amount of rock fragments and snowmelt tends to accumulate for short periods over the impermeable substratum. Areas of Gullied land produce concentrated surface runoff that can increase erosion on adjacent soils. These lands need on-site investigations to determine if restoration is needed. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.		

WDE Waca-Meiss complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir-Wyethia series; Mixed conifer-Wyethia series.	
Soil Map Unit Components	**Waca**	**Meiss**
Proportion (percent)	60	25
Soil Profile Description		
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	32 inches; weathered andesitic tuff breccia.	19 inches; hard volcanic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	12 to 20
Available Water Capacity Class	Low	Very low
AWC for top 20”	2.1-2.3	2.6-2.9
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Well drained	Somewhat excessively drained
Max Erosion Hazard	Moderate	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 160	 Not capable 60 to 160
Soil Manageability Group Class	 II 2ep	 II 2ed
Inclusions	Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils without high amounts of rock fragments similar to Waca. Included areas make up about 15 percent of the total area.	
Management Considerations	Waca soils are moderately deep, have a high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff.	

WDF Waca-Meiss complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir-Wyethia series; Mixed conifer-Wyethia series.	
Soil Map Unit Components	**Waca**	**Meiss**
Proportion (percent)	65	25

Soil Profile Description

Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.	
Substratum	32 inches; weathered andesitic tuff breccia.	19 inches; hard volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40	12 to 20
Available Water Capacity Class	Low	Very low
AWC for top 20”	2.1-2.3	2.6-2.9
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow
Drainage Class	Well drained	Somewhat excessively drained
Max Erosion Hazard	Moderate	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 60 to 160	 Not capable 60 to 160
Soil Manageability Group Class	 III 3Ep	 III 3Ed
Inclusions	Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils without high amounts of rock fragments similar to Waca. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. Waca soils are moderately deep, have a high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff.	

WEE Waca-Meiss-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation: Red fir-Alder/Willow series.

Soil Map Unit Components	Waca	Meiss	Cryumbrepts, wet
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.		
Substratum	32 inches; weathered andesitic tuff breccia.	19 inches; hard volcanic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	Variable
Available Water Capacity Class	Low	Very low	Very low
AWC for top 20”	2.1-2.3	2.6-2.9	
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow	Moderately rapid Very slow
Drainage Class	Well drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate to slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 140	 Not capable 60 to 160	 Not capable 170 to 640
Soil Manageability Group Class	 II 2ep	 II 2ed	 II 4EW

Inclusions: Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum soils, and Windy soils; soil with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

WEF Waca-Meiss-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation	Red fir-Alder/Willow series.		
Soil Map Unit Components	**Waca**	**Meiss**	**Cryumbrepts, wet**
Proportion (percent)	40	20	15
Soil Profile Description			
Surface Layer	0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid.	0 to 19 inches; brown sandy loam; moderate granular structure; neutral.	Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid.		
Substratum	32 inches; weathered andesitic tuff breccia.	19 inches; hard volcanic rock.	Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	12 to 20	Variable
Available Water Capacity Class	Low	Very low	Very low
AWC for top 20”	2.1-2.3	2.6-2.9	
Permeability: Subsoil Substratum	Moderately rapid Slow	Moderately rapid Very slow	Moderately rapid Very slow
Drainage Class	Well drained	Somewhat excessively drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Moderate to slight	Slight	Severe
Revegetating Exposed Subsoil	Slight	Severe	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4,5 RF, WF 60 to 140	 Not capable 60 to 160	 Not capable 170 to 640
Soil Manageability Group Class	 III 3Ep	 III 3Ed	 III 4EW
Inclusions	Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum soils, and Windy soils; soil with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 10 percent of the total area.		
Management Considerations	Steep slopes. Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.		

WOE Woodseye-Rock outcrop-Smokey complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,200 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation	Mixed brush-Barren series; Red fir-Mixed brush series.		
Soil Map Unit Components	**Woodseye**	**Rock outcrop**	**Smokey**
Proportion (percent)	45	25	15
Soil Profile Description			
Surface Layer	0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid.	Metasedimentary rock.	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.
Subsoil	14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid.		4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.
Substratum	19 inches; hard metasedimentary rock.		24 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	9 to 20		20 to 40
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.6-0.9		1.3-1.8
Permeability: Subsoil Substratum	Moderate Slow		Moderate Slow
Drainage Class	Somewhat excessively drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Severe		Moderate
Revegetating Exposed Subsoil	Severe		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 160 to 270		 5 RF 60 to 100
Soil Manageability Group Class	 III 3eP		 III 2ep
Inclusions	Included in this unit are small areas of Tinker soils; soils similar to Woodseye but with a thin surface layer; and soils without high amounts of rock fagments similar to Woodseye. Included areas make up about 15 percent of the total area.		
Management Considerations	These soils have a thin surface layer and a have high amount of rock fragments. Woodseye soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Smokey soils are moderately deep. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

WOG Woodseye-Rock outcrop-Smokey complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,200 feet Annual Precipitation: 65 to 75 inches

Typical Vegetation	Mixed brush-Barren series; Mixed brush-Red fir series.		
Soil Map Unit Components	**Woodseye**	**Rock outcrop**	**Smokey**
Proportion (percent)	40	30	15
Soil Profile Description			
Surface Layer	0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid.	Metasedimentary rock.	0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid.
Subsoil	14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid.		4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky structure; very strongly acid.
Substratum	19 inches; hard metasedimentary rock.		24 inches; weathered metasedimentary rock.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	9 to 20		20 to 40
Available Water Capacity Class	Very low		Very low
AWC for top 20”	0.6-0.9		1.3-1.8
Permeability: Subsoil Substratum	Moderate Slow		Moderate Slow
Drainage Class	Somewhat excessively drained		Well drained
Max Erosion Hazard	High		High
Seedling Mortality	Severe		Moderate
Revegetating Exposed Subsoil	Severe		Moderate
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not capable 160 to 270		 5 RF 60 to 100
Soil Manageability Group Class	 IV 4EP		 IV 4Ep
Inclusions	Included in this unit are small areas of Tinker soils; soils similar to Woodseye but with a thin surface layer; and soils without high amounts of rock fagments similar to Woodseye. Included areas make up about 15 percent of the total area.		
Management Considerations	Steep and very steep slopes. These soils have a thin surface layer and a have high amount of rock fragments. Woodseye soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Smokey soils are moderately deep. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.		

WRG Ledford Variant-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,000 to 9,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer series; Red fir series.	
Soil Map Unit Components	**Ledford Variant**	**Rock outcrop**
Proportion (percent)	50	35

Soil Profile Description

Surface Layer	0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid.	Granitic rock.
Subsoil	7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid.	
Substratum	28 inches; weathered granitic rock.	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	20 to 40
Available Water Capacity Class	Very low
AWC for top 20”	1.3-2.1
Permeability: Subsoil Substratum	Rapid Slow
Drainage Class	Excessively drained
Max Erosion Hazard	High
Seedling Mortality	Moderate to slight
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 4 RF, WF 100 to 140
Soil Manageability Group Class	 IV 4Ep
Inclusions	Included in this unit are small areas of shallow soils and similar soils with a thin light colored surface layer. Included areas make up about 15 percent of the total area.
Management Considerations	Steep and very steep slopes. Ledford Variant soils are moderately deep, have coarse textures, have a thin surface layer, and have a low cation exchange capapcity. Concentrated surface runoff from areas of Rock outcrop can increase the erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

XCE Kyburz-Aldi Variant-Jorge Variant complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series; Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

Soil Map Unit Components	Kyburz	Aldi Variant	Jorge Variant
Proportion (percent)	40	25	25
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral.	0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	8 to 32 inches; brown clay; massive; neutral.	11 to 35 inches; brown very gravelly loam; massive; slightly acid.
Substratum	34 inches; weathered andesitic rock.	32 inches; lake sediments.	35 inches; highly weathered sediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	20 to 40
Available Water Capacity Class	Low	Low	Low
AWC for top 20”	2.2-2.7	2.5-3.1	1.7-2.3
Permeability: Subsoil Substratum	Moderately slow Moderate	Slow Slow	Moderate Moderately rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated 120 to 190	 5 P 190 to 250	 5, 6 P 120 to 190
Soil Manageability Group Class	 II 2ep	 II 3epX	 II 2ep

Inclusions: Included in this unit are small areas of Aldi soils, Aquolls, Borolls, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi Variant soils reach field capacity rapidly and can produce surface runoff. They have a shallow effective rooting depth due to a dense clay subsoil, the subsoil has very low strength when wet, and the subsoil tends to perch water during the spring. Jorge Variant soils are moderately deep and have a high amount of rock fragments.

XCF Kyburz-Aldi Variant-Jorge Variant complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 25 inches

Typical Vegetation: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series; Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

Soil Map Unit Components	Kyburz	Aldi Variant	Jorge Variant
Proportion (percent)	40	25	25
Soil Profile Description			
Surface Layer	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.	0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral.	0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid.
Subsoil	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.	8 to 32 inches; brown clay; massive; neutral.	11 to 35 inches; brown very gravelly loam; massive; slightly acid.
Substratum	34 inches; weathered andesitic rock.	32 inches; lake sediments.	35 inches; highly weathered sediments.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	20 to 40	20 to 40	20 to 40
Available Water Capacity Class	Low	Low	Low
AWC for top 20”	2.2-2.7	2.5-3.1	1.7-2.3
Permeability: Subsoil Substratum	Moderately slow Moderate	Slow Slow	Moderate Moderately rapid
Drainage Class	Well drained	Well drained	Well drained
Max Erosion Hazard	High	High	High
Seedling Mortality	Slight	Slight	Moderate to slight
Revegetating Exposed Subsoil	Slight	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 Not rated 120 to 190	 5 P 190 to 250	 5, 6 P 120 to 190
Soil Manageability Group Class	 III 3Ep	 III 4EpX	 III 3Ep

Inclusions: Included in this unit are small areas of Aldi and Fugawee soils, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes and a relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi Variant soils reach field capacity rapidly and can produce surface runoff. They have a shallow effective rooting depth due to a dense clay subsoil, the subsoil has very low strength when wet, and the subsoil tends to perch water during the spring. Jorge Variant soils are moderately deep and have a high amount of rock fragments.

XRE Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation: Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Tinker	Rock outcrop, metamorphic	Cryumbrepts, wet
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Metamorphic rock.	Thick and dark colored; stratified sandy loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	21 to 33 inches; reddish brown very cobbly loam; massive; very slightly acid.		
Substratum	33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	22 to 40	metamorphic	Variable
Available Water Capacity Class	Very low		Very low
AWC for top 20”	1.4-1.6		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 RF, LP 270 to 380		 Not capable 170 to 640
Soil Manageability Group Class	 III 3epX		 III 4EW

Inclusions: Included in this unit are small areas of Celio, Tallac, and Woodseye soils, and soils similar to Tinker but with a thinner surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggregate.

XRF Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,600 feet Annual Precipitation: 60 to 70 inches

Typical Vegetation: Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Tinker	Rock outcrop, metamorphic	Cryumbrepts, wet
Proportion (percent)	45	25	20
Soil Profile Description			
Surface Layer	0 to 21 inches; brown cobbly loam; weak granular structure; medium acid.	Metamorphic rock.	Thick and dark colored; stratified sandy loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	21 to 33 inches; reddish brown very cobbly loam; massive; very slightly acid.		
Substratum	33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica.		Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	22 to 40	metamorphic	Variable
Available Water Capacity Class	Very Low		Very low
AWC for top 20”	1.4-1.6		
Permeability: Subsoil Substratum	Moderately rapid Very slow		Moderately rapid Very slow
Drainage Class	Well drained		Poorly drained
Max Erosion Hazard	High		Very high
Seedling Mortality	Severe to moderate		Severe
Revegetating Exposed Subsoil	Moderate		Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5 RF, LP 270 to 380		 Not capable 170 to 640
Soil Manageability Group Class	 IV 4EpX		 IV 4EW

Inclusions: Included in this unit are small areas of Celio, Tallac, and Woodseye soils, and soils similar to Tinker but with a thinner surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggregate.

XXE Jorge Variant-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,800 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Jorge Variant**	**Kyburz**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 11 inches; grayish brown gravelly loam; moderate granular structure; medium acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	11 to 35 inches; brown very gravelly loam; massive; slightly acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	35 inches; highly weathered sediments.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Low
AWC for top 20”	1.7-2.3	2.2-2.7
Permeability: Subsoil Substratum	Moderate Moderately rapid	Moderate Moderate
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190	 5 P, WF 120 to 190
Soil Manageability Group Class	 II 2ep	 II 2ep
Inclusions	Included in this unit are small areas of Aldi and Trojan soils, and shallow soils. Included areas make up about 10 percent of the total area.	
Management Considerations	Relatively short growing season and moderately deep soils. Jorge Variant soils have a high amount of rock fragments. Kyburz soils have a thin surface layer.	

XXF Jorge Variant-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,800 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation	Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.	
Soil Map Unit Components	**Jorge Variant**	**Kyburz**
Proportion (percent)	60	30
Soil Profile Description		
Surface Layer	0 to 11 inches; grayish brown gravelly loam; moderate granular structure; medium acid.	0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.
Subsoil	11 to 35 inches; brown very gravelly loam; massive; slightly acid.	6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid.
Substratum	35 inches; highly weathered sediments.	34 inches; weathered andesitic rock.
Soil Properties & Management Interpretations		
Effective Rooting Depth (inches)	20 to 40	20 to 40
Available Water Capacity Class	Low	Low
AWC for top 20”	1.7-2.3	2.2-2.7
Permeability: Subsoil Substratum	Moderate Moderately rapid	Moderately slow Moderate
Drainage Class	Well drained	Well drained
Max Erosion Hazard	High	High
Seedling Mortality	Moderate to slight	Slight
Revegetating Exposed Subsoil	Slight	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 5,6 P, WF 120 to 190	 5 P, WF 120 to 190
Soil Manageability Group Class	 III 3Ep	 III 3Ep
Inclusions	Included in this unit are small areas of Aldi and Trojan soils, and shallow soils. Included areas make up about 10 percent of the total area.	
Management Considerations	Steep slopes. Relatively short growing season and moderately deep soils. Jorge Variant soils have a high amount of rock fragments. Kyburz soils have a thin surface layer.	

ZEE Zeibright gravelly fine sandy loam, 2 to 30 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.
Soil Map Unit Components	**Zeibright gravelly fine sandy loam**
Proportion (percent)	85

Soil Profile Description

Surface Layer	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 80
Available Water Capacity Class	Very low to low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Rapid
Drainage Class	Well drained
Max Erosion Hazard	Moderate
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,2 SP, WF 50 to 440
Soil Manageability Group Class	 II 2ep
Inclusions	Included in this unit are small areas of McCarthy and Putt soils, and similar soils with a thin dark surface layer. Included areas make up about 15 percent of the total area.
Management Considerations	Coarse textures and a high amount of rock fragments.

ZEF Zeibright gravelly fine sandy loam, 30 to 50 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation	Mixed conifer-Mixed hardwood series.
Soil Map Unit Components	**Zeibright gravelly fine sandy loam**
Proportion (percent)	75

Soil Profile Description

Surface Layer	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.
Subsoil	21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.
Substratum	

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)	40 to 80
Available Water Capacity Class	Very low to low
AWC for top 20”	1.2-1.9
Permeability: Subsoil Substratum	Moderately rapid Rapid
Drainage Class	Well drained
Max Erosion Hazard	High
Seedling Mortality	Severe to moderate
Revegetating Exposed Subsoil	Slight
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3,2 SP, WF, P 50 to 440
Soil Manageability Group Class	 III 3Ep
Inclusions	Included in this unit are small areas of McCarthy and Putt soils, and similar soils with a thin dark surface layer. Included areas make up about 25 percent of the total area.
Management Considerations	Steep slopes, coarse textures, and a high amount of rock fragments.

ZFF Zeibright-Putt-Cryumbrepts, wet complex, 30 to 60 percent slopes

Elevation: 3,500 to 6,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series.

Soil Map Unit Components	Zeibright	Putt	Cryumbrepts, wet
Proportion (percent)	45	30	15
Soil Profile Description			
Surface Layer	0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid.	0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; medium acid.	Thick and dark colored; stratified sandy loam, and clay loam; gravelly, cobbly, or stony.
Subsoil	21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid.	20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica.	
Substratum			Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.
Soil Properties & Management Interpretations			
Effective Rooting Depth (inches)	40 to 80	20 to 34	Variable
Available Water Capacity Class	Very low to low	Very Low	Very low
AWC for top 20”	1.2-1.9	0.9-1.1	
Permeability: Subsoil Substratum	Moderately rapid Rapid	Moderately rapid Very slow	Moderately rapid Very slow
Drainage Class	Well drained	Well drained	Poorly drained
Max Erosion Hazard	High	High	Very high
Seedling Mortality	Severe to moderate	Severe	Severe
Revegetating Exposed Subsoil	Slight	Moderate	Severe
Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre)	 3 P, WF 50 to 440	 4 P, WF 70 to 120	 Not capable 170 to 640
Soil Manageability Group Class	 IV 4Ep	 IV 4EPX	 IV 4EW

Inclusions: Included in this unit are small areas of McCarthy soils, Rock outcrop, and soils similar to Zeibright but with a thick dark surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. Coarse textures and a high amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 9, the soils of the survey area are listed alphabetically and are classified according to the system. The classification categories are defined in the following paragraphs.

ORDER. Ten 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 Alfisol.

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

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; 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 Haploxeralf ("Hapl", meaning minimal horizonation, plus "xeralf", the suborder of the Alfisols that have a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic 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 known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjectives "Lithic Mollic" identifies the subgroup that has hard parent rock within 20 inches of the surface and is an intergrade between Haploxeralfs and Argixerolls. An example is Lithic Mollic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are the particle-size class, mineral content, temperature regime, depth 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 loamy, mixed, thermic Lithic Mollic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or the substratum can differ within a series.

TABLE 1. - Classification by Soil Name

Soil name	Family or higher taxonomic class
Ahart series	Medial, frigid Andic Xerumbrepts
Aiken series	Clayey, oxidic, mesic Xeric Haplohumults
Aldi series	Clayey, montmorillonitic, frigid Lithic Ultic Argixerolls
Aldi Variant	Fine, montmorillonitic, frigid Pachic Ultic Argixerolls
Aspen Variant	Loamy-skeletal, mixed, frigid Entic Haploxerolls
Badenaugh series	Loamy-skeletal, mixed, mesic Aridic Argixerolls
Boomer series	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Boomer Variant	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Bucking series	Sandy, mixed, frigid Entic Xerumbrepts
Bucking Variant	Sandy, mixed, frigid Entic Xerumbrepts
Celio series	Sandy-skeletal, mixed, frigid Entic Haplumbrepts
Celio Variant	Sandy-skeletal, mixed, frigid Entic Xerumbrepts
Chaix series	Coarse-loamy, mixed, mesic Dystric Xerochrepts
Chaix Variant	Coarse-loamy, mixed, frigid Dystric Xerochrepts
Chawanakee series	Loamy, mixed, mesic, shallow Dystric Xerochrepts
Cohasset series	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Crozier series	Fine-loamy, mixed, mesk Ultic Haploxeralfs
Deadwood series	Loamy-skeletal, mixed, mesic Dystric Lithic Xerochrepts
Delleker series	Fine-loamy, mixed, frigid Typic Haploxeralfs
Dotta series	Fine-loamy, mixed, mesic Pachic Argixerolls
*Dubakella series	Clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs
Dubakella Variant	Loamy-skeletal, serpentinitic, mesic Lithic Mollic Haploxeralfs
Euer series	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Euer Variant	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Forbes series	Fine, oxidic, mesic Ultic Haploxeralfs
*Franktown series	Loamy-skeletal, mixed, frigid Lithic Ultic Haploxerolls
Fugawee series	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Fugawee Variant	Loamy, mixed, frigid, shallow Ultic Haploxeralfs
Gefo series	Sandy, mixed, frigid Entic Xerumbrepts
Gefo Variant	Coarse-loamy, mixed, frigid Pachic Xerumbrepts
Haypress series	Sandy, mixed, frigid Entic Haploxerolls
Hoda series	Fine, kaolinitic, mesic Ultic Haploxeralfs
Holland series	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Horseshoe series	Fine-loamy, mixed, mesic Xeric Haplohumults
Hotaw series	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Hotaw Variant	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Hurlbut series	Fine-loamy, mixed, mesic Dystric Xerochrepts
Huysink series	Loamy-skeletal, mixed, mesic Xeric Hap1ohumults
*Inville series	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Jocal series	Fine-loamy, mixed, mesic Typic Haploxerults
Jocal Variant	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Jorge series	Loamy-skeletal, mixed, frigid Ultic Haploxeralfa
Jorge Variant	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Kinkel Variant	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Kyburz series	Fine-loamy, mixed, frigid Ultic Haploxeralfs

Soil name	Family or higher taxonomic class
Ledford series	Coarse-loamy, mixed, friged Entic Xerumbrepts
Ledford Variant	Coarse-loamy, mixed, frigid Entic Xerumbrepts
Ledmount series	Medial, mesic Lithic Xerumbrepts
Ledmount Variant	Medial-skeletal, frigid Lithic Xerumbrepts
Lorack series	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Lorack Variant	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
Mariposa series	Fine-loamy, mixed, mesic Ruptic-Lithic-Xerochreptic Haploxerults
Martineck series	Clayey-skeletal, montmorillonitic, mesic, shallow Aridic Durixerolls
Martis series	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Martis Variant	Loamy-skeletal, mixed, frigid Ultic Haploxeralfs
McCarthy series	Medial-skeletal, mesic Andic Xerumbrepts
Meiss series	Medial Lithic Cryumbrepts
Musick series	Fine-loamy, mixed, mesic Ultic Haploxeralfs
*Neer series	Medial-skeletal, mesic Andic Xerochrepts
Ponto Variant	Medial, mesic Andic Xerochrepts
Portola series	Medial, frigid Andic Xerochrepts
Putt series	Loamy-skeletal, mixed, mesic Andic Xerumbrepts
Rouen Variant	Fine-silty, mixed, frigid Typic Xerochrepts
Sattley series	Loamy-skeletal, mixed, frigid Ultic Argixerolls
*Sierraville series	Fine, montmorillonitic, frigid Ultic Haploxeralfs
Sites series	Clayey, oxidic, mesic Xeric Haplohumults
Smokey series	Loamy-skeletal, mixed, frigid Dystric Xerochrepts
Smokey Variant	Loamy-skeletal, mixed, frigid Dystric Xerochrepts
Tahoma series	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Tahoma Variant	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Tallac series	Loamy-skeletal, mixed, frigid Pachic Xerumbrepts
Tinker series	Loamy-skeletal, mixed, frigid Andic Haplumbrepts
Toiyabe series	Mixed, frigid, shallow Typic Xeropsamments
Trojan series	Fine-loamy, mixed, frigid Ultic Argixerolls
Umpa series	Loamy-skeletal, mixed, frigid Dystric Xerochrepts
Waca series	Medial-skeletal, frigid Andic Xerumbrepts
Windy series	Medial-skeletal, frigid Andic Xerumbrepts
Woodseye series	Loamy-skeletal, mixed, frigid Lithic Xerumbrepts
Woodseye Variant	Loamy-skeletal, mixed, frigid Lithic Xerumbrepts
Zeibright series	Loamy-skeletal, mixed, mesic Entic Xerumbrepts

*Soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series

Taxonomic Unit Descriptions

In this section, each soil recognized in the survey area is described. The descriptions are arranged in alphabetical order.

Characteristics of the soil and the material in which it formed are identified. A pedon, a small three-dimensional area of soil, that is typical of the soil in the survey area is described. The soil is compared with similar soils in the same taxonomic family and with soils in other closely related families. The soil is also compared with other soils that are associated geographically. The detailed description of each soil horizon follows standards in the Soil Survey Manual (9). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of characteristics of the soil.

N

AHART SERIES

The Ahart series consists of moderate1y deep, well drained sails on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Ahart soils are usually in areas where the rhyolitic tuff has been exposed from under a capping of andesitic mudfiow of the Merhten Formation. Slope ranges from 2 to 50 percent.

The vegetation is mainly semi-dense to dense stands of high elevation mixed confiers, consisting of white fir, red fir, and Jeffrey pine. Elevation is 5,500 to 8,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 50 to 70 days.

Permeability is moderate1y rapid. Available water capacity is low, runoff is medium, and the erosion potential is moderate to high.

The Ahart soils are similar to the McCarthy, Ponto Variant, and Portola soils, and are associated with the Meiss, Waca, and Ledmount Variant soils. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Portola soils have ochric epipedons and are skeletal. Meiss and Leadmount Variant sails are less than 20 inches deep, and have a lithic contact. Waca soils are skeletal.

Taxonomic class. These soils are medial, frigid Andic Xerumbrepts.

Typical pedon of Ahart gravelly sandy loam in a unit of Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes, about 1 mile southwest of Ice Lakes in the Onion Creek Experimental Forest, near the center of the NE1/4 of section 2, T. 16 N., R. 14 E.

O1 2 inches to 0; litter and duff.

All 0 to 8 inches; dark brown (l0YR 3/3) gravelly sandy loam, very dark grayish brown (l0YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine interstitial pores; 16 percent pebbles; slightly acid (pH 6.5); clear irregular boundary.

A12 8 to 16 inches; brown (l0YR 4/3) gravelly fine sandy loam, very dark grayish brown (l0YR 3/2) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, and many medium roots; many very fine and fine interstitial pores; 20 percent pebbles; medium acid (pH 5.7); clear wavy boundary.

A13 18 to 31 inches; brown (l0YR 5/3) gravelly line sandy loam, dark brown (l0YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 16 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

Cr 31 inches; weathered and fractured rhyolitic tuff, with few roots in cracks 4 to 6 in. apart.

Range in characteristics. The depth to weathered rhyolitic tuff is 20 to 40 inches. Thickness of the umbric epipedon is between 20 and 38 inches thick. The average base saturation is between 25 and 50 percent throughout the profile.

The A horizon has dry color of 10YR 3/3, 4/2, 4/3, 5/2, or 5/3 and moist color of l0YR 2/2, 3/2, 3/3, or 7.5YR. 3/2. It *is* gravelly fine sandy loam or gravelly sandy loam and contains 15 to 25 percent gravel. The A horizon is slightly acid to strongly acid.

Same pedons have a O horizon with dry colors of l0YR 4/3, 5/2, 5/3, 5/4, 6/3, or 6/4 and moist colors of 10YR 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4. It is sandy loam, fine sandy loam, or loam and has 5 to 20 percent gravel. The horizon is medium acid or strongly acid.

AIKEN SERIES

The Aiken series consists of very deep, well drained soils on flat or rounded ridgetops. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 60 percent.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 4,500 feet. The average annual precipitation is about 50 to 05 inches, the average annual air temperature is about 54 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately slow to slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is moderate to high.

The Aiken soils are similar to the Hoda, Musick, Sierra--ville, and Sites soils and associated with the Cohasset and Crozier soils. Cohasset soils are fine-loamy. Crozier soils are less than 40 inches deep and are fine-loamy. Sierra--ville soils have a frigid soil temperature regime. Sites soils have metasedimentary parent material and have argillic horizons in which the clay content decreases by more than 20 percent above 60 inches. Hoda and Musick soils have granitic parent material and have greater than 35 percent base saturation in the argillic horizon.

Taxonomic class. These soils are clayey, oxidic, mesic Xeric Haplohumults.

Typical pedon of Aiken loam is in a unit of Aiken-Cohasset complex, 2 to 30 percent slopes, about 5 miles northeast of Foresthill, 100 yards west of Foresthill Divide Road, in the center of section 9, T. 14 N., R.11 E.

A11 0 to 4 inches; brown (7.5YR 4/4) loam, dark reddish brown (5YR3/3) moist; weak to moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common to many fine and medium roots; common very fine and fine interstitial pores; neutral (pH 6.7); clear smooth boundary.

A12 4 to 10 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores, few fine tubular pores; common fine manganese shot; neutral (pH 0.6); clear smooth boundary.

A3 10 to 22 inches; reddish brown (5YR 4/4) loam, dark reddish brown (2.5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; few very fine and fine interstitial pores; few thin clay films lining pores; common fine manganese shot; slightly acid (pH 6.3); clear smooth boundary.

B1t 22 to 41 inches; yellowish red (5YR 4/8) clay loam, dark red (2.5YR 3/6) moist; massive; hard, firm, sticky and plastic; common to many medium and coarse roots; common very fine and fine interstitial and few very fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; common fine manganese shot; medium acid (pH 5.9); clear wavy boundary.

B21t 41 to 54 inches; red (2.5YR 5/6) clay, dark red (2.5YR 3/6) moist; massive; very hard, very firm, sticky and plastic; few fine and medium roots; many fine and medium tubular pores, common very fine and fine interstitial pores; common moderately thick clay films lining pores and as bridges between mineral grains; common fine manganese shot; medium acid (pH 5.9); clear wavy boundary.

B22t 54 to 70 inches; strong brown (7.5YR 5/6) clay, yellowish red (5YR 4/6) moist; massive; hard, firm, very sticky and very plastic; few to common very fine and fine interstitial and tubular pores; many moderately thick clay films lining pores and as bridges between mineral grains; common fine manganese shot; strongly acid (pH 5.5).

Range in characteristics. Thickness of the solum ranges from 60 to 90 inches. Manganese shot less than 5 millimeters in diameter is common throughout the profile. Weathered andesitic cobbles range from 0 to 25 percent, usually increasing in amounts in the lowermost horizon.

The A horizon has dry color of 7.5YR 3/2, 4/2, 4/4, 5/2, 5/4, 5YR 3/3, 4/3, 4/4, or 4/6 and has moist chromas less than 3.5 to a depth of 10 inches. It is neutral or slightly acid.

The upper B2t horizons has colors of 5YR 4/6, 4/8, 5/6 5/8, 2.5YR, 3/6 4/6 4/8, 5/6, or 5/8 The lower B2t horizons has colors of 7.5YR 5/4 5/6, 5YR 4/4, 5/4, 4/6, or 5/6. It is medium acid or strongly acid. Textures are clay in the B2t horizons and when present, the B3t horizon is clay loam. It is massive or has subangular blocky structure.

ALDI SERIES

The Aldi series consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from volcanic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly bitterbrush, sagebrush with some annual and perennial grasses. Elevation is 5,200 to 8,500 feet. The average annual precipitation is about 15 to 35 inches, the average annual air temperature is about 41 to 44 degrees F., and the average frost-free season is 50 to 75 days.

Permeability is slow. Available water capacity is very low to low. Runoff is medium to rapid and the erosion potential is high to very high.

The Aldi soils are similar to the Franktown and Fugawee Variant soils. Franktown soils are loamy-skeletal. Fugawee Variant soils are fine-loamy.

Taxonomic class. These soils are clayey, montmorillonitic, frigid Lithic Ultic Argixerolls.

Typical pedon of Aldi loam in a unit of Aldi-Aquoll-Kyburz complex, 2 to 9 percent slopes, about one mile southeast of Woodchopper Spring near the center of section 19, T. 18 N., R. 17 E.

01 Trace; fresh and slightly decomposed grass and bitterbrush litter.

A1 0 to 8 inches; brown (10YR 4/3) loam, dark reddish brown (5YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots, few medium roots; few very fine tubular pores, common very fine and fine interstitial pores; slightly acid (pH 8.5); clear wavy boundary.

B2t 8 to 18 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; neutral (pH 7.0); diffuse irregular boundary.

R 18 inches; weathered andesite or basalt.

Range in characteristics. Depth to rock is 10 to 20 inches. Base saturation is 50 percent in the soil surface. Thickness of the mollic epipedon is 7 to 14 inches.

The A horizon has dry color of l0YR 5/2, 5/3, or 4/3 and moist color of 5YR 3/2, 7.5YR 3/2, or l0YR 3/2. Texture is loam with 5 percent gravel and it is slightly acid or neutral.

The B2t horizon is 7.5YR 4/4, 5/4, l0YR 5/3 dry and 7.5YR 4/4, l0YR 3/2, 3/4 moist. Texture is clay loam with 5 to 15 percent gravel and it is medium acid to neutral.

ALDI VARIANT

The Aldi Variant soils consist of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from lake sediments. Slope ranges from 2 to 50 percent.

The vegetation is mainly sagebrush and grass. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 20 to 35 inches, the average annual air temperature is 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is slow. Available water capacity is low, runoff is medium, and the erosion potential is high.

The Aldi Variant soils are similar to Aldi soils and are associated with the Jorge Variant, Kyburz, and Martis Variant soils. Aldi soils are less than 20 inches deep to a lithic contact. Kyburz soils are line-loamy. Jorge Variant and Martis Variant soils are skeletal.

Taxonomic class. These soils are fine, montmorillonitic, frigid Pachic Ultic Argixerolls.

Typical pedon of Aldi Variant cobbly sandy loam in a unit of Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes, approximately 1/4 mile east of Boca Reservoir along the Boca Spring Road near the center of section 10, T. 18 N., R. 17 E.

A1 0 to 8 inches; dark grayish brown (10YR 4/2) cobbly sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very line and fine interstitial pores; 20 percent cobbles; neutral (pH 7.0); clear wavy boundary.

B1t 8 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common medium and coarse roots; common very fine interstitial pores; common moderately thick clay films lining pores; neutral (pH 7.0); gradual wavy boundary.

B2t 19 to 32 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; massive; very hard, very firm, very sticky and very plastic; common fine and medium roots, few coarse roots; few very line interstitial pores; common moderately thick clay films lining pores; neutral (pH 7.0); clear wavy boundary.

Cr 32 inches; lake sediments.

Range in characteristics: Depth to soft lake sediments ranges from 20 to 40 inches. Reaction is neutral to medium acid.

The A horizon has dry colors of 10YR3/3, 4/2, 4/3, or 5/3 with moist colors of 7.5YR 3/2, or l0YR 2/2. Textures are sandy loam, silt loam, or loam with 0 to 20 percent cobbles and stones.

The B horizon has colors of l0YR 5/3, 4/3, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, or 3/2. Textures are clay loam in the upper B horizon and clay in the lower part. Gravel ranges from 0 to 20 percent throughout the horizon.

AQUOLLS

Aquolls consist of shallow and moderately deep, very poorly drained soils in drainageways and on valley floors. These soils formed in residuum weathered from mixed alluvium. Slope ranges from 0 to 15 percent.

The native vegetation is mainly wet meadow vegetation consisting of Carex and Juncus with some alder, willow, and aspen. Elevation is 2,000 to 8,500 feet. The average annual precipitation is about 18 to 80 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically, the surface layer is thick and dark colored, stratified coarse sand to clay. The subsoil is stratified layers with mottles of sandy loam to clay, underlain by stratified alluvium.

Permeability is variable. Available water capacity varies from very low to moderate and runoff is very slow to ponded. Aquolls are used mainly for meadowland forage. A high water table provides summertime moisture for native meadow vegetation. They commonly develop on broad flats in the flood plains of streams and are naturally wet with mottles in the subsurface horizons. Coarse fragments both pebble and cobble size are highly variable throughout with some profiles having more than 35 percent by volume. B2t horizons are present in some profiles while others have just AC horizons.

ASPEN VARIANT

Aspen Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from metavolcanic rock. Slope ranges from 2 to 50 percent.

The native vegetation is mainly semi-dense stands of high elevation mixed conifers and brush, consisting of white fir, Jeffrey pine and ceanothus. Considerable acreage of this soil was burned over during the 1960 Donner Ridge fire. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 20 to 25 inches, the average annual air temperature is 36 to 40 degrees F, and the average frost-free season is 20 to 25 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Aspen Variant soils are similar to the Haypress soils and are associated with the Rouen Variant and Sierraville soils. Haypress soils are not skeletal. Sierraville soils are fine textured and Rouen Variant soils have ochric epipedons with low base saturation.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Entic Haploxerolls.

Typical pedon of Aspen Variant in a unit of Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes, in the NW1/4 of section 34, T. 20 N., R. 17 E.

01 Trace; fresh and decomposed litter.

A11 0 to 10 inches; dark grayish brown (2.5Y4/2) gravelly very fine sandy loam, very dark brown (10YR 2/2) moist; weak fne granular structure; 20 percent pebbles; mildly alkaline (pH 7.5).

A12 10 to 18 inches; grayish brown (2.5Y 5/2) cobbly fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; 20 percent pebbles, 15 percent cobbles; neutral (pH 7.0).

C1 18 to 29 inches; light brownish gray (2.5Y 6/2). very cobbly fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; 20 percent pebbles, 20 percent cobbles; slightly acid (pH 6.3).

C2 29 to 40 inches; light brownish gray (2.5Y 6/2) very cobbly fine sandy loam, very dark grayish brown (2.5Y3/2) moist; weak fine and medium subangular blocky structure; 30 percent pebbles,15 percent cobbles; medium acid (pH 6.0).

C3r 40 inches; weathered metavolcanic rock.

Range in characteristics. Depth to weathered metavolcanic rock is greater than 40 inches. Gravel range from 15 to 30 percent and cobbles 0 to 20 percent throughout the profile.

The A horizon has dry colors of 2.5Y 5/2, 4/2, l0YR 5/2, or 4/2 and moist colors of l0YR 3/2, or 2/2. Textures are sandy loam, fine sandy loam, or gravelly very fine sandy loam.

The C horizon has dry colors of 2.5Y 6/2, 6/4, l0YR 6/2, or 6/4. Textures are very cobbly or very gravelly fine sandy loam or sandy loam.

BADENAUGH SERIES

The Badenaugh Series consists of deep, well drained soils on lacustrine terraces and flood plains. These soils formed in residuum weathered from cobbly mixed alluvium. These sediments are near the shoreline of the ancient lake that once filled valley basins, mostly on the perimeter of Sierra Valley. Slope ranges from 2 to 30 percent.

The vegetation is mainly mixed brush with scattered conifers consisting of sagebrush, bitterbrush, and widely scattered Jeffrey pine and juniper. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches, the average annual air temperature is about 40 to 46 degrees F., and the average frost free season is 50 to 60 days.

Permeability is moderately rapid. Available water capacity is low, runoff is slow to medium, and the erosion potential is high.

The Badenaugh soils are similar to the Aldi Variant and Dotta soils and are associated with the Dotta- and Martineck soils. Aldi Variant and Dotta soils are not skeletal and Aldi Variant soils have a frigid soil temperature regime. Martineck soils have a duripan within 20 inches.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Aridic Argixerolls.

Typical pedon of Badenaugh cobbly loam in a unit of Badenaugh-Martineck-Dotta association 2 to 30 percent slopes, about one mile southeast of the town of Loyalton along the east side of Smithneck Canyon Road, 1,500 feet south-southeast of the N1/4 corner of section 19, T. 21 N., R. 16 E.

A11 0 to 2 inches; brown (7.5YR 4/2) cobbly loam, very dark brown (l0YR 2/2) moist; weak fine granular structure; loose, friable, slightly sticky and slightly plastic; many very fine roots, common medium roots, and few coarse roots; many very fine and fine interstitial pores; 10 percent pebbles and 20 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

A12 2 to 6 inches; brown (7.5YR 4/2) very cobbly loam, very dark brown (l0YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, common medium roots, and few coarse roots; common very fine and fine interstitial pores; very few thin clay films lining pores and as bridges between mineral grains; 15 percent pebbles and 25 percent cobbles; neutral (pH 6.8); gradual smooth boundary.

B1t 6 to 12 inches; brown (7.5YR 4/2) very cobbly loam, very dark brown (l0YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine tubular and interstitial pores; few thin clay films lining pores and as bridges between mineral grains; 20 percent pebbles and 30 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B2t 12 to 17 inches; brown (7.5YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, slightly firm, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores, few medium tubular pores; common moderately thick clay films lining pores and as bridges between nuneral grains; 15 percent pebbles and 35 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

B3 17 to 27 inches; brown (7.5YR 4/2) variable mineral color and black manganese stains, very cobbly sandy clay loam, brown (l0YR4/3) and dark brown (7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine tubular and interstitial pores; common moderately thick clay films lining pores, as bridges between mineral grains, and on cobble; 40 percent cobbles and 10 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C1 27 to 50 inches; brown (7.5YR 4/2) variable mineral color and black manganese stains, extremely cobbly sandy clay loam, mixed brown and dark brown (l0YR 5/3, 7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine interstitial pores; moderately thick clay films on cobbles and bridging sand grains; 50 percent cobbles and 25 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C2 50 to 60 inches; brown (l0YR 5/3) matrix with variable colored mineral grains, extremely cobbly sandy clay loam, mixed brown and dark brown (l0YR 5/3, 7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine and fine pores; moderately thick clay films on cobbles and bridging sand grains; 65 percent cobbles and 10 percent pebbles; medium

acid. (pH 6.0).

Range in characteristics. Thickness of the solum ranges from 24 to 48 inches. Andesitic rock fragments of pebble and cobble size occur throughout the profile. The rock fragment content is more than 35 percent and is as much as 80 percent in some pedons.

The A horizon has dry color of 10YR 5/2, 4/2, 5/3, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, 4/4, or 3/2. It is cobbly or very cobbly sandy loam or loam.

The B2t horizon has dry color of l0YR 6/2, 5/2, 5/3, 4/3, 7.5YR 4/2, 4/4, 5/2, or 5/4. It is very cobbly clay loam or sandy clay loam.

The C horizon is extremely cobbly sandy loam or sandy clay loam.

BOOMER SERIES

The Boomer series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of mixed conifers and hardwoods consisting of Douglas-fir, white fir, ponderosa pine, sugar pine, incense cedar, black oak, tan oak, and madrone. Elevation is 1,500 to 3,200 feet. The average annual precipitation is about 50 to 65 inches, the average annual air temperature is about 56 to 62 degrees F, and the average frost-free season is 175 to 225 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium to rapid, and the erosion potential is high.

The Boomer soils are associated with the Boomer Variant, Hoda, Jocal, Mariposa, Musick and Sites. Boomer Variant soils are skeletal. Hoda and Musick soils have granitic parent material and have a higher percentage of coarse sand in the argillic horizon. Jocal, Mariposa, and Sites soils have less than 35 percent base saturation in the Bt horizons.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Boomer sandy loam in a unit of Boomer-Boomer Variant complex, 50 to 75 slopes, at the base of the Succer Bar Trail, in section 24, T. 19 N., R. 7 E.

O1 1 inch to 0; fresh and decomposed litter.

Al 0 to 3 inches; brown (7.5YR 4/4) sandy loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; medium acid (pH 5.6); abrupt wavy boundary.

B1t 3 to 16 inches; light brown (7.5YR 6/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots, few medium and coarse roots; many fine tubular and intersitital pores; common moderately thick clay films lining pores; medium acid (pH 5.6); gradual wavy boundary.

B2t 16 to 41 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, sticky and plastic; few fine, medium, and coarse roots; few fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; medium acid (pH 5.8); diffuse boundary.

B3t 41 to 60 inches; varigated color, sandy clay loam; massive; slightly hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; medium acid (pH 5.8); diffuse boundary.

Range in characteristics. Thickness of the rooting zone ranges from 40 to 65 inches. The soil is slightly acid to medium acid throughtout the profile.

The A horizon has dry colors of 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 4/4, or 4/2 and moist colors of 5YR 3/3, 3/4, 4/3, or 4/4. It is sandy loam or loam. Gravel content ranges from 0 to 15 percent, and cobbles range from 0 to 10 percent.

B2t horizons have dry colors of 5YR 6/8, 6/6, 5/4, 2.5YR 5/8, 5/6, 4/8, or 4/6 and moist colors of 5YR 3/4, 4/4, 4/6, 4/8, 5/6, 5/8, 2.5YR 3/6, 4/8, or 5/8. Textures are sandy clay loam, silty clay loam, or clay loam. Gravel content ranges from 5 to 15 percent and cobbles range from 0 to 5 percent.

BOOMER VARIANT

The Boomer Variant consists of a deep and very deep, well drained soil on mountainsides. These soils formed in residuum weathered from basic igneous rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of mixed conifers and hardwoods and madrone. Elevation is 1,500 to 3,200 feet. The average annual precipitation is about 50 to 65 inches, the average annual air temperature is about 56 to 62 degrees F, and the average frost free season is 175 to 225 days.

Permeability is moderately slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Boomer Variant soils are associated with the Boomer, Hoda, Jocal, Mariposa, Musick, and Sites soils. Boomer soils are not skeletal. Hoda and Musick soils are formed on granitic rock and have a higher amount of coarse sand in the argillic horizon. Mariposa, Jocal, and Sites soils have less than 35 percent base saturation in the argillic horizon.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs

Typical pedon of Boomer Variant cobbly sandy loam in a unit of Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes, about 1.5 miles west of Camptonville in the NW1/4NWl/4 of section 3, T. 18 N., R. 8 E.

O1 1 inch to 0; litter and duff.

A11 0 to 2 inches; brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist; strong medium granular structure; soft, friable, nonsticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores, 10 percent pebbles; 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

A12 2 to 9 inches; brown (7.5YR 4/4) cobbly sandy loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, firm, nonsticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores; 15 percent pebbles, 15 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

B1t 9 to 21 inches; red (2.5YR 4/6) very cobbly loam, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots, common fine, medium, and coarse roots; common fine interstitial pores; many colloids staining mineral grains; 5 percent pebbles, 30 percent cobbles; slightly acid (pH 0.3); diffuse wavy boundary.

B2lt 21 to 40 inches; red (2.5YR 4/6) very cobbly clay loam, dark red (2.5YR 3/6) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; few fine and medium tubular pores; many moderately thick clay films on faces of peds and lining pores; 5 percent pebbles, 45 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

B22t 40 to 60 inches; red (2.5YR 4/6) very cobbly clay loam, red (2.5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, firm, sticky and plastic; few fine and medium roots; common fine and medium interstitial pores, few fine tubular pores; continuous thin clay films on faces of peds, many thin clay films lining pores; 5 percent pebbles, 50 percent cobbles; slightly acid (pH 6.5); diffuse wavy boundary.

B3t 60 to 90 inches; red (2.5YR 4/6) very cobbly clay loam, red (2.5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; many thin clay films on faces of peds, common moderately thick clay films lining pores; 5 percent pebbles, 45 percent cobbles; slightly acid (pH 6.5).

Range in characteristics. Thickness of the rooting zone ranges from 50 to over 90 inches.

The A horizon has colors of 7.5YR 5/4, 5/2, 4/4, 4/2, 5YR 5/4, 5/3, 4/4, or 4/3. It is sandy loam or loam with 5 to 15 percent gravel and 10 to 15 percent cobbles.

The B horizon has colors of 2.5YR 5/8, 5/6, 4/8, 4/6, 3/6. Textures are very cobbly or extremely cobbly loam or clay loam with 5 to 10 percent gravel and 30 to 55 percent cobbles.

BOROLLS

Borolls consist of shallow and moderately deep, poorly drained soils on the periphery of wet meadows. The meadows occur in valleys and drainageways. These soils form in residuum weathered from mixed alluvium. Slope ranges from 0 to 5 percent.

The native vegetation is mainly meadow vegetation consisting of carex, juncus, and grasses. Elevation is 5,000 to 8,500 feet. The average annual precipitation is about 30 to 60 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically, the surface layer is thick and dark colored, stratified coarse sand to clay. The subsoil is stratified sandy loam to clay. Permeability is variable and mottles are common in lower subsoil. Available water capacity is very low and runoff is slow to very slow.

Borolls commonly develop on the gentle slopes above the floodplains of broad drainages or meadows. Rock fragments, both pebble and cobble size, are highly variable throughout, with some profiles having more than 35 percent. Some soils have Bt horizons between the A and C horizons, while others have only A and C horizons.

BUCKING SERIES

The Bucking series consists of deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of high elevation mixed conifers, consisting of white fir, red fir and Jeffrey pine. Elevation is 5,400 to 7,400 feet. The average annual precipitation is about 50 to 60 inches, the average annual air temperature is about 40 to 43 degrees F, and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Bucking soils are similar to the Chaix, Gefo, and Haypress soils and they are associated with the Bucking Variant soils. Bucking Variant soils are less than 40 inches deep. Chaix soils have a mesic soil temperature regime and are less than 40 inches deep. Gefo soils formed in alluvium from glacial outwash and do not have a lithic or paralithic contact. Haypress soils have a mollic epipedon.

Taxonomic class. Theses soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Bucking loamy sand in a unit of Bucking-Bucking Variant complex, 2 to 30 percent slopes, in the NW1/4NWl/4 of section 11, T. 20 N., R. 13 E.

O1 2 inches to 0; litter, duff and twigs.

A11 0 to 6 inches; brown (l0YR 5/3) loamy sand, dark brown (l0YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine and medium roots; many very fine interstitial pores; slightly acid (pH 6.5); gradual wavy boundary.

A12 6 to 11 inches; brown (l0YR 5/3) loamy sand, dark brown (l0YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, and few medium roots; many very fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

Cl 11 to 30 inches; pale brown (l0YR 6/3) loamy sand, dark brown (l0YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.3); gradual wavy boundary.

C2 30 to 51 inches; pale brown (l0YR 6/3) loamy sand, dark brown (l0YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and coarse roots; many very fine interstitial pores; 3 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

C3r 51 inches; highly weathered granitic rock.

Range in characteristics. Depth to highly weathered granitic rock ranges from 40 to over 60 inches. Textures are loamy sand or loamy coarse sand and the reaction is slightly acid to medium acid throughout the profile.

The A horizon has dry colors of l0YR 4/3, 5/3, 5/2, or 4/2 with moist colors of l0YR 3/1, 3/3, 2/2, or 3/2.

The C horizon has dry colors of l0YR 5/4, 5/6, 6/4, or 6/3, with moist colors of l0YR 3/3, 4/3, 4/4, or 3/4.

BUCKING VARIANT

The Bucking Variant consists of moderately deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, and ponderosa pine. Elevation is 5,400 to 7,400 feet. The average annual precipitation is about 50 to 60 inches, the average annual air temperature is about 40 to 43 degrees F., and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low, runoff is slow to medium, and the erosion potential is high.

The Bucking Variant soils are similar to the Chaix, Ledford Variant, and Toiyabe soils and are associated with the Bucking soils. Bucking soils are over 40 inches deep. Chaix soils have a mesic soil temperature regime. Ledford Variant soils are coarse loamy. Toiyabe soils are less than 20 inches deep.

Taxonomic class. These soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Bucking Variant in a unit of Bucking-Bucking Variant complex, 30 to 75 percent slopes, in the NW1/4NE1/4 of section 2, T. 20 N., R. 13 E.

01 Trace; needles and litter.

All 0 to 4 inches; grayish brown (l0YR 5/2) loamy coarse sand, very dark grayish brown (l0YR 3/2) moist; weak fine granular structure; *soft,* very friable, nonsticky and nonplastic; many very fine roots, few fine roots; many very fine interstitial pores; 2 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); gradual smooth boundary.

A12 4 to 11 inches; brown (l0YR 5/3) loamy coarse sand, dark brown (l0YR 3/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine and coarse roots; many very fine interstitial pores; 2 percent pebbles, 5 percent cobbles; slightly acid (pH 6.2); gradual smooth boundary.

Cl 11 to 29 inches; pale brown (l0YR 6/3) loamy coarse sand., brown (l0YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and coarse roots; many very fine interstitial pores; 2 percent pebbles. 5 percent cobbles; medium acid (ph 6.0); clear wavy boundary.

C2r 29 inches; weathered granitic rock.

Range in characteristics. Depth to weathered granitic rock ranges from 20 to 40 inches. Textures are loamy sand or loamy coarse sand throughout the profile. Reaction is slightly acid to medium acid throughout the profile.

The A horizon has dry colors of l0YR 5/3, 5/2, or 4/3 and moist colors of l0YR 3/3, 3/2, or 2/2.

The C horizon has dry colors of l0YR 6/4, 6/3, or 5/4 and moist colors of l0YR 4/4 or 4/3.

CELIO SERIES

The Celio series consists of deep, somewhat poorly drained soils on outwash plains. These soils formed in residuum weathered from glacial deposits. Slope ranges from 2 to 30 percent.

The vegetation is mainly dense stands of lodgepole pine with an understory of brush and perennial grasses. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 35 to 50 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is rapid to the silica cemented pan and slow below. Available water capacity is very low, runoff is slow, and the erosion potential is high.

Celio soils are similar to the Tallac and Tinker soils and are associated with the Gefo soils. Tallac and Tinker soils are loamy-skeletal. Gefo soils are not skeletal.

Taxonomic class. These soils are sandy-skeletal, mixed, frigid Entic Haplumbrepts.

Typical pedon of Celio gravelly sandy loam in a unit of Celia-Gefo-Aquolls complex, 2 to 30 percent slopes, approximately three miles east of Webber Lake on the south side of the Old Henness Pass Road in the southwest quarter of section 16, T. 19 N., R. 15 E.

O1 1 inch to 0; fresh and decomposed conifer needles.

A11 0 to 5 inches; grayish brown (l0YR 5/2) gravelly sandy loam, very dark grayish brown (l0YR 3/2) moist; weak medium granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, medium and coarse roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.3); diffuse wavy boundary.

A12 5 to 12 inches; brown (l0YR 5/3) gravelly sandy loam, dark brown (l0YR 3/3) moist; massive; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.2); diffuse wavy boundary.

C1 12 to 30 inches; light yellowish brawn (l0YR 6/4) very cobbly loamy sand, brown (l0YR 4/3) moist; common fine distinct yellowish red (5YR 4/6) mottles; massive; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 20 percent pebbles, 15 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

C2 30 to 40 inches; light yellowish brown (l0YR 6/4) extremely gravelly loamy coarse sand, brown (l0YR 4/3) moist; common fine distinct yellowish red (5YR 4/6) mottles; massive; hard, firm, nonsticky and nonplastic; 45 percent pebbles, 20 percent cobbles; strongly acid (pH 5.5).

C3si 40 inches; variable colored; weakly cemented with silica; extremely gravelly loamy coarse sand; massive, very hard, very firm, nonsticky and nonplastic; roots matted on surface; 50 percent pebbles and 15 percent cobbles.

Range in characteristics. The depth to the weakly cemented silica pan ranges from 40 to 60 inches.

The A horizon has dry color of l0YR 3/3, 4/2, 4/3, 5/2, or 5/3 and moist colors of l0YR 3/2 or 3/3. Textures are sandy loam, very fine sandy loam, or loamy sand and contains 15 to 20 percent gravel and 0 to 20 percent cobbles. It is slightly acid to medium acid.

The C horizon has dry color of l0YR 5/3, 5/4, 6/4, or 6/3 and moist colors of l0YR 3/3, 4/3, 4/4, or 7.5YR 4/4. Textures are gravelly or cobbly, very gravelly, or extremely gravelly loamy coarse sand or loamy sand with 20 to 75 percent gravel and 0 to 20 percent cobbles. It is slightly acid to strongly acid. The Csi horizon has variable colors in the hues of l0R through 7.5YR. The duripan is weakly to strongly cemented and is very firm or extremely firm. Mottles occur below 20 inches.

CELIO VARIANT

Celio Variant soils consist of deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 30 to 50 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, Jeffrey pine with manzanita and mountain whitethorn. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 40 to 44 degrees F., and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low to low, runoff is rapid, and the erosion potential is high.

The Celio Variant soils are similar to the Bucking, Celio, and Ledford soils. Bucking soils have a mollic epipedon and are sandy. Celio soils have a udic soil moisture regime. Ledford soils are not skeletal.

Taxonomic class. These soils are sandy-skeletal, mixed, frigid Entic Xerumbrepts.

Typical pedon of Celio Variant sandy loam in a unit of Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes, 0.65 miles south from Lunch Creek Road on road to Chapman Creek, in the SE1/4SEl/4 of sec. 29, T. 21 N., R. 13 E.

O1 Trace; litter and duff.

A11 0 to 2 inches; dark grayish brown (l0YR 4/2) sandy loam, very dark grayish brown (l0YR 3/2) moist; strong very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.2); clear wavy boundary.

A12 2 to 10 inches; brown (l0YR 5/2) stony coarse sandy loam, dark brown (l0YR 3/3) moist; strong very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots; many very fine interstitial pores; 10 percent pebbles, 5 percent cobbles, 20 percent stones; medium acid (pH 6.0); clear wavy boundary.

C1 10 to 22 inches; pale brown (l0YR 6/3) very stony loamy coarse sand, brown (l0YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine interstitial pores; 5 percent pebbles, 10 percent cobbles, 25 percent stones; medium acid (pH 6.0); gradual wavy boundary.

C2 22 to 42 inches; very pale brown (l0YR 7/3) very stony loamy coarse sand, brown (l0YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; many very fine interstitial pores; 5 percent pebbles, 10 percent cobbles, 35 percent stones; medium acid (pH 6.0); gradual wavy boundary.

C3 42 to 61 inches; very pale brown (l0YR 7/3) very stony loamy coarse sand, pale brown (l0YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent pebbles, 15 percent cobbles, 20 percent stones; medium acid (pH 6.0).

Range in characteristics. Depth to weathered granitic rock is greater than 40 Inches. The soil is 35 to 75 percent rock fragments of which 25 to 50 percent are cobbles and stones.

The A horizon has dry colors of 10YR 5/3, 4/3, or 4/2 and moist colors of 10YR 3/3 or 3/2. Textures are cobbly, stony, very cobbly, or very stony sandy loam or coarse sandy loam. It is slightly acid to medium acid.

The C horizon has dry colors of 10YR 7/3, 6/4, or 6/3 and moist colors of 10YR 6/3, 5/4, 5/3, 4/4, or 4/3. Textures are cobbly, stony, very cobbly, or very stony loamy sand or loamy coarse sand. It is medium acid.

CHAIX SERIES

The Chaix series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 30 to 75 percent.

The vegetation is mainly open stands of hardwoods and mixed conifers with an understory of brush, consisting of black oak, live oak, Douglas-fir, ponderosa pine, incense cedar, manzanita, ceanothus, and bear clover. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 54 to 62 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Chaix soils are similar to the Ahart, Chaix Variant, Chawanakee, and Waca soils and are associated with the Chawanakee, Holland, and Hotaw soils. Ahart and Waca soils are formed in material weathered from volcanic rock and are dominated by amorphous material. Chaix Variant soils have a frigid soil temperature regime. Chawanakee soils are less than 20 inches deep. Holland and Hotaw soils have argillic horizons.

Taxonomic class. These soils are coarse-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Chaix coarse sandy loam in a unit of Holland-Hoda-Hotaw complex, 30 to 50 percent slopes, eroded, in the NE1/4NW1/4 of section 28, T. 18 N., R. 8 E.

O1 Trace; litter and duff.

A11 0 to 5 inches; grayish brown (l0YR 5/2) coarse sandy loam, very dark grayish brown (l0YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine and medium roots; common fine and medium interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

A12 5 to 9 inches; pale brown (l0YR 6/3) coarse sandy loam, dark brown (l0YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, nonsticky and nonplastic; common fine roots; few medium and coarse interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

B2 9 to 15 inches; very pale brown (l0YR 7/3) coarse sandy loam, yellowish brown (l0YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine and medium interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

C1 15 to 29 inches; very pale brown (l0YR7/4) coarse sandy loam, light yellowish brown (l0YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few medium and coarse interstitial pores;. strongly acid (pH 5.5); abrupt wavy boundary.

C2r 29 inches; weathered granodiorite.

Range in characteristics. Depth to weathered granitic rock is 20 to 40 inches. Textures are coarse sandy loam and sandy loam throughout the profile.

The A horizon has dry colors of l0YR 6/3, 5/3, 5/2, 4/3, or 3/3. Moist chromas are either greater than 3 or values are greater than 5 below the upper six inches of the A horizon. It is slightly acid.

The B2 horizon has color of l0YR 7/3, 7/1, or 6/3. It is slightly acid to strongly acid.

The C horizon has color of l0YR 7/4 or 7/2. It is slightly acid to strongly acid. Mica or light and dark mineral grains are very apparent in the C horizon.

CHAIX VARIANT

Chaix Variant soils consist of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 2 to 50 percent.

The vegetation is mainly open stands of high elevation mixed conifers and brush consisting of red fir, white fir, sugar pine, manzanita, ceanothus, and huckleberry oak. Elevation is 5,500 to 7,000 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is abbout 52 to 56 degrees F, and the average frost-free season is 150 to 175 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is high.

The Chaix Variant soils are similar to the Ahart, Chaix, Chawanakee, and Waca soils and are associated with the Hotaw Variant and Tahoma Variant soils. Ahart and Waca soils are formed on volcanic parent material and have textures dominated by amorphous materials. Chaix and Chawanakee soils have a mesic soil temperature regime and Chawanakee soils are less than 20 inches deep. Hotaw Variant and Tahoma Variant soils have argillic horizons.

Taxonomic class. These soils are coarse-loamy, mixed, frigid Dystric Xerochrepts.

Typical pedon of Chaix Variant gravelly sandy loam in a unit of Chaix Variant-Rock outcrop-Cryumbrepts,wet complex, 2 to 30 percent slopes, about one-half mile south of Willow Springs in the NWl/4NWl/4 of section 24, T. 18 N., R. 11 E.

O1 1 inch to 0; litter and duff.

Al 0 to 10 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 4/6) moist; weak very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots, few coarse roots; many very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B2 10 to 22 inches; yellow (l0YR 8/6) sandy loam, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few fine interstitial pores; 10 percent pebbles; very strongly acid (pH 5.0); gradual irregular boundary.

Cr 22 inches; highly weathered granodiorite; mineral grains retaining original rock structure; few coarse roots.

Range in characteristics. Depth to weathered granitic rock is from 20 to 40 inches. Textures are coarse sandy loam or sandy loam. Base saturation in the upper 30 inches is less than 60 percent.

The A horizon has dry colors of 7.5YR 6/6, 5/4, 5YR 6/6, or 5/6. Moist colors are 7.5YR 5/6, 4/6; 5YR 5/4, or 4/4. It is slightly acid to medium acid.

The B horizon has dry colors of l0YR 8/8, 8/6, 7/8, 7/6; 7.5YR 7/8, 7/6, 6/8, or 6/6. Moist colors are 7.5YR 7/6, 6/6, 6/4, 5/4; 5YR 6/6, 5/6, or 4/6. It is strongly acid to very strongly acid.

CHAWANAKEE SERIES

The Chawanakee series consist of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 30 to 75 percent.

The vegetation is mainly open stands of hardwoods with brush and scattered mixed conifers consisting of live oak, black oak, tan oak, madrone, manzanita, ceanothus, bear clover, Douglas-fir, ponderosa pine, and incense cedar. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 52 to 62 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is very high.

The Chawanakee soils are similar to the Meiss, Ledmount, Ledmount Variant, and Woodseye Variant soils and are associated with the Chaix, Hoda, Holland, and Hotaw soils. Chaix soils are more than 20 inches deep. Hoda, Holland, and Hotaw soils have argillic horizons. Ledmount soils have mollic epipedons and have volcanic parent material. Ledmount Variant, Meiss, and Woodseye Variant soils have a frigid soil temperature regime and have volcanic parent.

Taxonomic class. These soils are loamy, mixed, mesic, shallow Dystric Xerochrepts.

Typical pedon of Chawanakee coarse sandy loam in a unit of Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes, about 4 miles southwest of Camptonville in the SW1/4SE1/4 of section 21, T. 18 N., R. 8 E.

O1 Scattered litter and duff.

Al 0 to 5 inches; grayish brown (l0YR 5/2) coarse sandy loam, dark brown (l0YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine pores; slightly acid (pH 6.3); clear smooth boundary.

B2 5 to 15 inches; very pale brown (l0YR 7/4) coarse sandy loam, yellowish brown (l0YR 5/4) moist; massive, soft, very friable, nonsticky and nonplastic, common fine and medium roots; common fine pores; strongly acid (pH 5.5); abrupt wavy boundary.

Cr 15 inches; decomposed granodiorite.

Range in characteristics. Depth to weathered granitic rock is from 12 to 20 inches. Textures are coarse sandy loam or sandy loam.

The A horizon has colors of 10YR 6/3, 5/3, 5/2, 4/3, or 2.5Y 5/2. It is slightly acid or medium acid.

The B2 horizon has colors of 10YR 7/4, 7/3, 5/4, 6/4, 6/3, 6/2, 5/4, 5/3, 5/2; 2.5Y 6/4, or 6/2. It is medium acid or strongly acid.

COHASSET SERIES

The Cohasset series consists of deep and very deep, well drained soils on flat or rounded ridge tops. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percent.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 5,800 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is moderate to high.

The Cohasset soils are similar to the Jocal, Tahoma, and Trojan soils and are associated with the Aiken and Crozier soils. Aiken soils are clayey. Crozier soils are moderately deep. Jocal soils have metasedimentary parent material and a base saturation which is less than 35 percent in the lower part of the argillic horizon. Tahoma and Trojan soils have a frigid soil temperature regime.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Cohasset loam in a unit of Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, about 10 miles north of Foresthill, about 0.1 miles from the intersection of the Giant Ridge Road and the Giant Gap Road in the NW1/4SW1/4 of section 8, T. 15 N., R. 11 E.

Al 0 to 4 inches; brown (7.5YR 4/4) loam, dark reddish brown (5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

A3 4 to 12 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky. structure parting to weak very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine interstitial pores; slightly acid (p11 6.5); gradual smooth boundary.

Blt 12 to 19 inches; reddish brown (5YR 4/3) loam. reddish brown (5YR4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; common very fine and fine interstitial pores and few fine tubular pores; common thin clay films lining pores, few thin clay films on faces of peds; slightly acid (pH6.3); clear smooth boundary.

B2t 19 to 35 inches; yellowish red (5YR5/6) clay loam, yellowish red(5YR4/6) moist; weak fine and medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; common medium and coarse roots; common very fine and fine interstitial pores and few very fine and fine tubular pores; many moderately thick clay films lining pores, common thin clay films on faces of peds; slightly acid (pH 6.3); clear smooth boundary.

B3t 35 to 61 inches; reddish yellow (7.5YR6/6) gravelly clay loam, yellowish red (5YR4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few very fine and fine tubular pores; many moderately thick clay films in pores; 20 percent pebbles; slightly acid (pH6.3); abrupt wavy boundary.

Cr 61inches ;weathered andesitic conglomerate.

Range in characteristics. Thickness of the solum ranges from 40 to 80 inches. Manganese shot 1 to 2 millimeters in diameter may be present throughout the soil. Cobbles are 0 to 20 percent of the soil material usually increasing in the lower Bt horizons. Gravel ranges from 0 to 20 percent throughout the profile. Soil reaction ranges from neutral to strongly acid, becoming more acidic with depth.

The A horizon has colors of 7.5YR 4/2, 4/4, 5/4, 5YR 3/3, 3/4, 4/3, 4/4, 5/3, 5/4, or 5/6 and has moist chromas greater than 3.5 within a depth of 10 inches. It is neutral to slightly acid and is loam or sandy loam.

The B2t horizon has colors of 7.5YR 5/6, 6/6, 5YR 4/3, 4/4, 4/6, 4/8, or 5/6. It is slightly acid to medium acid and is loam or clay loam. It is massive, or structure is angular blocky or subangular blocky.

CROZIER SERIES

The Crozier series consists of moderately deep, well drained soils on rounded ridgetops and mountainsides. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percents.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 5,500 feet. The average annual precipitation is about 55 to 70 inches, the average annual air temperature is about 50 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderate slow. Available water capacity is low to moderate, runoff is medium, and the erosion potential is moderate to high.

The Crozier soils are similar to the Fugawee and Hotaw soils and are associated with the Aiken, Cohasset, and McCarthy soils. Aiken soils have more than 35 percent clay in the B horizon. Cohasset soils are over 40 inches deep. Fugawee soils have a frigid soil temperature regime. Hotaw soils are formed from granitic rock and contain 16 to 26 percent coarse and very coarse sand. McCarthy soils do not hane an argillic horizon and are skeletal.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Crozier loam in a unit of Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, about 12 miles north of Foresthill, approximately 80 yards east and 15 yards north of the intersection of the Giant Gap Road and the Giant Gap Ridge Road (15N24) in the center of section 8, T. 15 N., R. 11 E.

O1 2 inches to 0; litter and duff.

Al 0 to 7 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

A3 7 to 15 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary.

Blt 15 to 24 inches; yellowish red (5YR 4/6) loam, reddish brown (5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and coarse roots; common very fine and fine interstitial pores, few medium interstitial pores; common thin clay films lining pores; medium acid (pH 5.7); clear smooth boundary.

B2t 24 to 38 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few medium and coarse roots; common very fine and fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 19 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

Cr 38 inches; weathered andesitic tuff breccia.

Range in characteristics. Depth to weathered rock ranges from 20 to 40 inches. Rock fragments are 0 to 30 percent of the profile, nsually increasing in amount in the lower most horizons.

The A horizon has colors of 7.5YR 3/2, 4/2, 4/4, 5/4, 5YR 3/3, 3/4, 4/3, 4/4, 5/3, or 5/4 with moist chromas of 4 in the upper A horizon. Textures are sandy loam or loam and reaction is neutral or slightly acid.

The B2t has colors of 5YR 7/6 6/6, 5/6, 5/4, 4/6, or 4/4. Texture is clay loam and reaction is slightly acid or medium acid.

CRYUMBREPTS, WET

Cryumbrepts, wet consist of poorly drained soils in drainageways. These soils formed in alluvium and colluvium from mixed sources. Slope ranges from 2 to 75 percent.

The native vegetation consists of alders, willows, carex, and juncus. Elevation is 2,000 to 9,000 feet. The average annual precipitation is about 20 to 80 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically the surface layer is thick and dark colored, stratified gravelly, cobbly, or stony sandy loam, silt loam and clay loam. The substratum is stratified gravelly, cobbly, or stony loam to clay loam with dark colored mottles.

Permeability is moderately rapid, available water capacity is very low, and runoff is slow to medium. They have a high water table most of the year.

Runoff from surrounding areas moves laterally through the soil and provides summer moisture for native vegetation. Mottles with low chroma commonly occur at depths of 6 to 20 inches. Rock fragments range from 3 to 80 percent. Some profiles have cambic horizons.

DEADWOOD SERIES

The Deadwood series consists of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 0 to 75 percent.

The vegetation is mainly open stands of hardwoods with brush and scattered conifers consisting of live oak, huckleberry oak, Douglas-fir, white fir, Jeffrey pine, and ponderosa pines. Elevation is 2,000 to 6,000 feet. The average annual precipitation is about 40 to 70 inches, the average annual air temperature is 47 to 57 degrees F., and the average frost free season is 110 to 225 days.

Permeability is moderately rapid, available water capacity is very low, and runoff is rapid to very rapid. The erosion potential is high.

The Deadwood soils are similar to the Chawanakee, Ledmount, and Woodseye soils and is associated with the Hurlbut and Mariposa soils. Chawanakee soils have formed on granitic parent material, are not skeletal and have a paralithic contact. Hurlbut and Mariposa soils are moderatly deep and are not skeletal. Ledmount soils are influenced by vitric pyroclastic materials and have a umbric epipedon. Woodseye soils have a frigid soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Dystric Lithic Xerochrepts.

Typical pedon of Deadwood very gravelly sandy loam in a unit of Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes, approximately 20 miles northeast of Foresthill, 0.2 miles northwest of Secret Creek on the American Hill Road, near the center of the SE1/4 of section 1, T. 15 N., R. 12 E.

O1 1 inch to 0; pine litter and duff.

Al 0 to 3 inches; dark gray (l0YR 4/1) very gravelly sandy loam, very dark gray (l0YR 3/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 45 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

B2t 3 to 13 inches; light yellowish brown (l0YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; brown (10YR 5/3), and dark brown (7.5YR 3/2) moist in the upper 2 inches; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots, common medium and coarse roots; common very fine interstitial pores; common thin clay films in pores; 65 percent pebbles; medium acid (pH 6.0); abrupt irregular boundary.

R 13 inches; hard metasedimentary rock; few medium and coarse roots in fractures (6 to 10 inches apart).

Range in characteristics. Depth to bedrock ranges from 10 to 20 inches. Rock fragments range from 20 to 75 percent throughout the profile averaging more than 35 percent.

The A horizon has dry colors of l0YR 4/1,4/2,4/3, 5/2, 5/3, 5/4, 6/3, 6/4, 7.5YR 4/2, 4/4, or 5/2, and moist colors of l0YR 3/1, 3/2, 3/3, 3/4,4/2,4/3, 4/4, 7.5YR 3/2, 4/2, or 4/4. The dark layers are thin or absent in some pedons or may extend into the upper 2 inches of the B horizon. It is sandy loam, loam or silt loam and is gravelly, very gravelly, or extremely gravelly, and is slightly acid or medium acid.

The B2t horizon has dry colors of l0YR 6/3, 6/4, 7/4, 7/6, 7.5YR 5/6, 6/4, or 6/6 and has moist colors of l0YR 6/2, 6/3, 5/4, 5/6, 4/4, 7.5YR 5/4, 4/4, 4/6, or 5/6. It is silt loam, sandy loam, or loam and is very gravelly or extremely gravelly. Structure is weak or moderate subangular blocky. Base saturation is less than 60 percent throughout the horizon.

DELLEKER SERIES

The Delleker series consists of deep and very deep, well drained soils on terraces. These soils formed in ashy alluvium. Slope ranges from 2 to 30 percent.

The vegetation is mainly Jeffrey pine and sagebrush with some white fir. Elevation is 4,800 to 5,400 feet. The average annual precipitation is about 15 to 26 inches, the average annual air temperature is 45 to 47 degrees F., and the average frost-free season is 50 to 60 days.

Permeability is moderate. Available water capacity is low to moderate, runoff is medium, and the erosion potential is high.

The Delleker soils are similar to the Kyburz, Sattley, Tahoma, and Trojan soils. Kyburz soils are moderatly deep. Sattley and Trojan soils have mollic epipedons and Sattley soils are skeletal. Tahoma soils have base saturation less than 75 percent in the argillic horizon.

Taxonomic class. These soils are fine-loamy, mixed, frigid Typic Haploxeralfs.

Typical pedon of Delleker sandy loam in a unit of Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes, about 1 mile north of Calpine in the SW1/4NW1/4 of sec. 17, T.21 N., R. 14E.

O1 1 inch to 0; needles, twigs and duff.

Al 0 to 5 inches; grayish brown (l0YR 5/2) sandy loam, very dark grayish brown (l0YR 3/2) moist; moderate fine platy structure parting to weak very fine and fine granular; soft, friable, nonsticky and nonplastic; many very fine roots, few fine and coarse roots; many very fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.2); clear wavy boundary.

A3 5 to 12 inches; light yellowish brown (l0YR 6/4) sandy loam, dark yellowish brown (l0YR 4/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine interstitial pores, few fine tubular pores; 3 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

Blt 12 to 24 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores, few line tubular pores; common thin clay films as bridges between mineral grains and lining pores; 3 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B2t 24 to 46 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine interstitial pores, few fine tubular pores; many thin clay films as bridges between mineral grains and lining pores; medium acid (pH 6.0); clear wavy boundary.

Cl 46 to 50 inches; very pale brown (l0YR 7/3) loam, pale brown (l0YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; medium acid (pH 6.0).

Range in characteristics. Thickness of solum ranges from 40 to 70 inches. It is slightly acid or medium acid.

The A horizon has dry colors of l0YR 6/4, 6/3, 5/4, 5/3, or 5/2 and has moist colors of l0YR 4/4, 4/3, 3/3, or 3/2. Textures are sandy loam or loam.

The B2t horizon has dry colors of l0YR 6/6, 6/4, 5/4, 5/4, 7.5YR 6/6, 6/4, 5/6, or 5/4 dry. Moist colors are l0YR 6/4, 5/4, 4/4, 7.5YR 6/4, or 4/4. Textures are sandy clay loam or clay loam.

DOTTA SERIES

The Dotta series consists of deep, well drained soils on lacustrine terraces and alluvial fans. These soils formed in residuum weathered from near-shore lake deposits and basic alluvium from adjoining uplands. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush and scattered conifers, consisting of sagebrush, bitterbrush, juniper and Jeffrey pine. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches, the average annual air temperature is about 40 to 46 degrees F, and the average frost free season is 50 to 60 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is very slow to slow, and the erosion potential is high.

The Dotta soils are similar to the Aldi Variant and Badenaugh soils and are associated with the Martineck soils. Aldi Variant soils have fine textured argillic horirzons and have a frigid soil temperature regime. Badenaugh and Martineck soils are skeletal and Martineck soils have a duripan within 20 inches.

Taxonomic class. These soils are fine-loamy, mixed, mesic Pachic Argixerolls.

Typical pedon of Dotta sandy loam in a unit of Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, approximately 3/8 mile east of Highway 49, 4 1/2 miles northeast of Loyalton, about 750 feet south and 750 feet west of the NE corner of section 29, T. 22 N., R. 16 E.

A11 0 to 6 inches; gray (l0YR 5/1) sandy loam, very dark brown (l0YR 2/2) moist; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.2); clear smooth boundary.

A12 6 to 13 inches; gray (l0YR 5/1) sandy loam, very dark brown (l0YR 2/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.2); gradual smooth boundary.

Blt 13 to 21 inches; gray (l0YR 5/1) loam, very dark grayish brown (l0YR 3/2) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine tubular pores, common medium tubular and interstitial pores; common thin clay films lining pores and on faces of peds; medium acid (pH 6.0); gradual smooth boundary.

B2lt 21 to 30 inches; grayish brown (l0YR 5/2) sandy clay loam, dark brown (l0YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; medium acid (pH 8.0); clear wavy boundary.

B22t 30 to 41 inches; grayish brown (2.5Y 5/2) sandy clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic parting to strong fine and medium angular blocky structure; very hard, firm, sticky and plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; slightly acid (pH 6.3); clear wavy boundary.

Cl 41 to 59 inches; light brownish gray (l0YR 6/2) sandy loam, brown (l0YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

C2 59 to 68 inches; pale brown (l0YR 6/3) coarse sandy loam, dark brown (l0YR 3/3) moist; massive; hard, firm, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; neutral. (pH 7.0):

Range in characteristics. Solum thickness ranges from 40 to 60 inches. Gravel and cobble content ranges from 0 to 35 percent.

The A horirzon has dry color of l0YR 5/1, 4/1, 3/1, 5/2, 4/2, 5/3, or 4/3. It is sandy loam or loam.

The B2t horizon has dry color of 2.5Y 5/2, 4/2, l0YR 5/2, 5/3, 4/2, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, or 4/4. It is loam, sandy clay loam, or clay loam.

DUBAKELLA SERIES

The Dubakella series consists of moderately deep, well dralned soils on rounded ridgetops. These soils formed in residuum weathered from serpentinized bedrock. Slope ranges from 2 to 75 percent.

The vegetation is mainly open stands of conifers, consisting of ponderosa pine, incense cedar and Douglas-fir with manzanita and ceanothus. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 65 inches, the average annual air temperature is about 48 to 54 degrees F., the average frost-free season is 150 to 225 days.

Permeability is slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Dubakella soils are similar to and associated with the Dubakella Variant and the Forbes soils. Dubakella Variant soils have hard rock within 20 inches of the soil surface. Forbes soils are greater than 40 inches deep.

Taxonomic class. These soils are clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs.

Typical pedon of Dubakella loam in a unit of Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes in the NEl/4NWl/4 of section 32, T. 15 N., R. 11 E.

O1 1 inch to 0; litter and duff.

Al 0 to 3 inches; dark red (2.5YR 3/6) loam, dark reddish brown (2.5YR 2/4) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; 5 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B21t 3 to 15 inches; red (2.5YR 4/6) cobbly clay loam, dark red (2.5YR 3/6) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, medlium and coarse roots; common very fine and fine interstitial pores, few fine and medium tubular pores; many moderately thlick clay films on faces of peds and many thick clay films lining pores; 25 percent cobbles; neutral (pH 7.3); clear wavy boundary.

B22t 15 to 32 inches; yellowish red (5YR 4/6) very cobbly clay loam, dark red (2.5YR 3/6) moist; massive; hard, friable, sticky and plastic; common medium and coarse roots; many very fine and fine interstitial pores; many thick clay films lining pores; 60 percent partly weathered serpentinized cobbles; mildly alkaline (pH 7.5); clear wavy boundary.

R 32 inches; serpentinized bedrock.

Range in characteristics. Thickness of the solum ranges from 21 to 34 inches, and the depth to bedrock is 20 to 40 inches. it is slightly acid to mildly alkaline throughout the profile.

The A horizon has dry colors of 5YR 5/4, 5/3, 4/4, 4/3; 2.5YR 5/6, 5/4, 4/6, 4/4, or 3/6 and has moist values less than 3.5 in the upper 4 inches after mixing. It is loam with 5 to 20 percent rock fragments.

The B2t horirzon has colors of 5YR 5/4, 5/3, 4/6, 4/4, 4/3; 2.5YR 5/8, 5/6, 5/4, 4/8, 4/6, 4/4, or 3/6. It is clay loam or clay with 35 to 60 percent Rock fragments.

The Dubakella soils in this survey area are a taxajunct to the Dubakella series because it has 2.5YR colors in the A and B horizons. This difference, however, does not significantly affect use and management.

DUBAKELLA VARIANT

Dubakella Variant soils are shallow, well drained soils on rounded ridgetops. These soils formed in residuum weathered from serpentinized bedrock. Slope ranges from 2 to 75 percent.

The vegetation is mainly manzanita and ceanothus with scattered conifers, consisting of ponderosa pine, incense cedar, and Douglas-fir. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 48 to 54 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Dubakella Variant soils are similar to the Ledmount and Meiss soils and are associated with the Forbes and Dubakella soils. Ledmount and Meiss soils do not have argillic horizons and are dominated by vitric pyroclastic material. Dubakella and Forbes soils are over 20 inches deep and do not have lithic contacts.

Taxonomic class. These soils are loamy-skeletal, serpentinitic, mesic Lithic Mollic Haploxeralfs.

Typical pedon of Dubakella Variant gravelly loam in a unit of Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes, in the NEl/4SWl/4 of section 13, T. 17 N., R. 10 E.

O1 Trace; litter and duff.

Al 0 to 5 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, few fine roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 5 to 13 inches; brown (7.5YR 4/4) very cobbly clay loam, dark reddish brown (5YR 3/4) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; many very fine interstitial pores; common thin clay films on faces of peds; 40 percent cobbles, 5 percent pebbles; neutral (pH 7.0); abrupt wavy boundary.

R 13 inches; fractured serpentinitic rock.

Range in characteristics. Depth to serpentinized bedrock ranges from 12 to 20 inches. Cobbles range from 0 to 50 percent throughout the profile. It is neutral to slightly acid.

The A horizon has dry colors of 5YR 4/3, 4/4, 5/3, 5/4, or 7.5YR 5/4 and moist colors of 7.5YR 3/2,4/2, or 4/4. It is loam.

The B horizon has dry colors of 7.5YR 4/4 or 5/4 and moist colors of 5YR 3/3 or 3/4.

EUER SERIES

The Euer series consists of deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of predominately volcanic origin. Slope ranges from 2 to 30 percent.

The vegetation is mainly scattered Jeffrey pine with sagebrush, bitterbrush and grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Euer soils are similar to the Tallac and Zeibright soils. They are associated with the Kyburz, Martis, and Trojan soils. The Tallac and Zeibright soils do not have argillic horizons. The Kyburz, Martis, and Trojan soils are not skeletal.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Euer sandy loam in a unit of Euer-Martis Variant complex, 5 to 30 percent slopes, about 5 miles northeast of Truckee; .9 mile west from intersection of East Meadow Road along Slaughter House Road; near center of NW1/4NE1/4, section 23, T. 18 N., R. 18 E.

O1 2 inches to 0; pine litter and duff.

Al 0 to 5 inches; brown (l0YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; few very fine, fine, and medium roots; common very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.2); abrupt wavy boundary.

A3 5 to 15 inches; brown (10YR4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine interstitial pores; about 15 percent pebbles; very few thin clay films lining pores, root channels, and as bridges between mineral grains; slightly acid (pH 6.5); clear wavy boundary.

B2t 15 to 24 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, medium, and coarse roots; few very fine interstitial and tubular pores; few moderately thick clay films lining pores, root channels, and as bridges between mineral grains; 40 percent pebbles and 3 percent cobbles; slightly acid (pH 6.2); gradual irregular boundary.

B3 24 to 47 inches; light yellowish brown (l0YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and slightly plastic; few fine and medium roots; few very fine and fine tubular pores; few colloid stains on minerals grains; 65 percent pebbles and 5 percent cobbles; medium acid (pH 6.0); gradual irregular boundary.

C 47 to 65 inches; brownish yellow (10YR 6/6) extremely gravelly sandy loam, yellowish brown (l0YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; few very fine and fine tubular pores; few colloid stains on mineral grains; 85 percent pebbles and 5 percent cobbles; medium acid. (pH 6.0).

Range in characteristics. The umbric epipedon is 10 to 15 inches thick and in some pedons includes the upper part of the B horizon. The base saturation is 35 to 50 percent in the upper horizons. The effective rooting depth is greater than 40 inches.

The A horizon has dry colors of l0YR 4/2, 4/3, 5/2, or 5/3 and moist colors of l0YR 3/2, 3/3, or 7.5YR 3/2. It is coarse sandy loam, sandy loam, or loam with 10 to 20 percent gravel. This horizon has granular or weak subangular blocky structure. it is slightly acid or medium acid.

The B2t horizon has dry colors of 10YR 5/3, 5/4, or 6/6 and moist colors of 10YR 3/3, 5/6, 7.5YR 3/2, or 4/4. It is clay loam, sandy clay loart, or sandy loam and has 35 to 70 percent rock fragments. This horizon has subangular blocky structure or is massive. it is slightly acid or medium acid.

EUER VARIANT

The Euer Variant soils consists of deep and very deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly eastside mixed conifer, consisting of Jeffrey pine and ponderosa pine with sagebrush and bitterbrush. Elevation is 5,500 to 6,000 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F. and the average frost-free season is 20 to 40 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow, and the erosion potential is moderate.

The Euer Variant soils are similar to the Jorge, Sattley, Tallac, and Zeibright soils and assoicated with the Euer, Kyburz, and Trojan soils. Euer soils are skeletal. Jorge and Sattley soils have from volcanic parent material and are skeletal. Fugawee soils are less than 40 inches deep to a paralithic contact and the Trojan soils have mollic epipedons. Tallac and Zeibright soils do not have argillic horizons and Zeibright soils have a mesic soil temperature regime.

Taxonomic unit. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Euer Variant gravelly sandy loam in a unit of Martis-Euer Variant complex, 2 to 5 percent slopes, about 0.4 mile north of Interstate 80 and 100 feet east of Highway 89 near the center of NE1/4NW1/4 of section 11, T. 17 N., R. 16 E.

O1 2 inches to 0; litter and duff.

A11 0 to 6 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate very thick platy parting to moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine and coarse roots, common medium roots; many medium and coarse interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 6 to 12 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots, common coarse roots, and many medium roots; common very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B2lt 12 to 24 inches; pale brown (10YR 6/3) gravelly clay loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few fine and many medium roots; common fine interstitial and tubular pores; common moderately thick clay films on faces of peds and continuous thin clay films lining pores; 15 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B22t 24 to 33 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine interstitial and tubular pores; common moderately thick clay films on faces of peds, continuous thin clay films lining pores; 40 percent pebbles; strongly acid (pH 5.5); abrupt irregular boundary.

B23t 33 to 47 inches; pale brown (10YR 6/3) extremely gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few medium and coarse roots; very few fine interstitial pores; many moderately thick clay films lining pores and as bridges between mineral grains; 60 percent pebbles, 20 percent cobbles; strongly acid (pH 5.5); clear irregular boundary.

B3t 47 to 70 inches; pale brown (10YR 6/3) extremely gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine, medium, and coarse roots; few very fine interstitial pores; many moderately thick clay films lining pores and as bridges between mineral grains; 70 percent pebbles, 20 percent cobbles; strongly- acid (pH 5.5).

Range in characteristics. Thickness of the solum ranges from 40 to 70 inches. The umbric epipedon is 10 -to 20 inches thick and in some pedons includes the upper B horizon. Base saturation is 35 to 50 percent in some portion of the argillic horizon.

The A horizon has dry colors of 10YR 4/3, 4/4,5/3, 5/4, 7.5 YR 4/4, or 5/4. Moist colors are 10YR 2/2, 3/2, 3/3, or 7.5YR 3/2. It is sandy loam or loam with 5 to 20 percent gravel. This horizon has granular, subangular blocky, or thick platy structure. It is slightly acid to strongly acid.

The upper Bt horizon has dry colors of 10YR 5/3, 5/4,

6/3, 6/4. 7.5YR 5/4, or 6/4. Moist colors are 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 7.5YR 3/2, 3/4, 4/2, or 4/4. It is clay loam or loam with 15 to 40 percent gravel and 3 to 5 percent cobbles. This horizon has subangular blocky structure structure or is massive. It is medium acid to strongly acid.

The lower part of the Bt horizon has dry colors of 10YR 5/3, 6/3, or 6/4 and moist colors of 7.5YR 3/2, 10YR 3/4, 4/3, or 4/4. It is sandy clay loam or clay loam and has 3 to 20 percent cobbles and 10 to 80 percent gravel. Rock fragments increase with increasing depth and exceed 35 percent below 32 inches in some pedons.

FORBES SERIES

The Forbes series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from ultramafic rock. Slope range. from 2 to 50 percent.

The vegetation is mainly semi-dense to dense mixed conifers, consisting of Douglas-fir, white fir, ponderosa pine and incense cedar. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 65 inches, the average annual air temperature is 49 to 57 degrees F., and the average frost free season is 110 to 200 days.

Permeability is moderately slow to slow. Available water capacity is low to moderate, runoff is moderate to rapid, and the erosion potential is high.

The Forbes soils are similar to the Aiken, Hoda, Sierra ville, and Sites soils and associated with the Dubakelia, Jocal, and Mariposa soils. Aiken soils have volcanic parent material and have an umbric epipedon. Dubakella soils are less than 40 inches deep and are skeletal. Hoda soils do not have hues of 2.5YR in the profile and have granitic parent material. Jocal and Mariposa soils have metasedimentary parent material and are fine-loamy. Sierraville soils have a frigid soil temperature regime and are formed from basic volcanic rock. Sites and Aiken soils have base saturation of less than 35 percent in the argillic horizon.

Taxonomic class. These soils are fine, oxidic, mesic Ultic Palexeralfs.

Typical pedon of Forbes gravelly loam in a unit of Forbes-Dubakella complex, 2 to 30 percent slopes, apporoximately 7 miles northeast of Foresthill, in the SW1/45W1/4 of section 29, T. 15 N., R. 11 E.

O1 2 inches to 0; litter and duff.

A11 0 to 9 inches; dark red (2.5YR 3/6) gravelly loam, dark reddish brown (2.5YR 2/4) moist; weak very fine and fine granular and subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 7.0); gradual smooth boundary.

A12 9 to 20 inches; dark red (2.5YR 3/6) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium angular blocky structure; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots, few coarse roots; common very fine tubular pores and few very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 7.2); dear smooth boundary.

B21t 20 to 31 inches; yellowish red (5YR 4/4) gravelly clay, dark red (2.5YR 3/6) moist; massive; slightly hard, firm, very sticky and very plastic; few very fine and fine roots; common very fine and fine interstitial pores and few very fine and fine tubular pores; many moderately thick clay films lining pores; 25 percent pebbles; mildly alkaline (pH 7.5); clear wavy boundary.

B22t 31 to 53 inches; strong brown (7.5YR5/8) gravelly silty clay, red (2.5YR 4/6) moist; massive; hard, firm, very sticky and very plastic; few very fine, fine, and medium roots; few very fine and fine interstitial pores and common very fine and fine tubular pores; many moderately thick clay films lining pores; 25 percent pebbles; mildly alkaline (pH 7.5); clear wavy boundary.

B3t 53 to 61 inches; reddish yellow (7.5YR6/8) gravelly silty clay loam, strong brown (7.5YR5/8) moist; massive; slightly hard, firm, sticky and plastic; few fine and medium roots; common moderately thick clay films lining pores; 30 percent pebbles; moderately alkaline (pH 8.0).

Range in characteristics. Thickness of the solum ranges from 40 to 65 inches. Rock fragment range from 5 to 35 percent.

The A horizon has dry colors of 2.5YR5/4, 3/6, 4/4, 4/6, 5 YR 4/4,or 5/4 and moist colors of 10R 3/4, 2.5YR 2.5/4,. 3/4, 3/6, 4/6, or 5YR 4/6 Textures are loam or clay loam. It is slightly acid to neutral and the structure is granular, subangular blocky, or angular blocky.

The B2t horizon has dry colors of 7.5YR 5/8, 5/4, 5 YR 4/4, 4/6, 2.5YR 3/6, or 4/6. Moist colors are 5 YR 3/4, 2.5YR 3/4, 3/6, 4/6, 10R 3/4,or 3/6. It is clay, silty clay, or clay loam and is neutral to moderately alkaline.

FRANKTOWN SERIES

The Franktown series consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from volcanic rocic. Slope ranges from 2 to 75 percent.

The vegetation is mainly sagebrush, squawcarpet, and greenleaf manzanita. Elevation is 5,200 to 6,500 feet. The average annual precipitation is about 15 to 30 inches, the average annual air temperature is about 41 to 44 degrees F., and the average frost-free season ranges from 50 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid, and the erosion potential is high to very high.

The Franktown soils are similar to the Aldi soils and is associated with the Kyburz soils. Aldi soils have argillic horizons. Kyburz soils are 20 to 40 inches deep to a paralithic contact.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Lithic Ultic Haploxerolls.

Typical pedon of Franktown gravelly loam in a unit of Franktown-Alding-Rock outcrop complex, 2 to 30 percent slopes, about three miles east of Sierraville on the road to Lemon Canyon in the SW1/4 of section 16, T. 20 N., R. 15 E.

O1 1/2 inch to 0; fresh and decomposed grass litter.

A11 0 to 4 inches; brown (10YR.. 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine and medium tubular and interstitial pores; 17 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); clear irregular boundary.

A12 4 to 15 inches; brown (10YR 5/3) extremely gravelly coarse sandy clay loam, dark brown (7.5YR. 3/2) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine interstitial pores, few very fine tubular pores; 50 percent pebbles, 15 percent cobbles; neutral (pH 7.0).

R 15 inches; weathered volcanic rock with some soil in cracks.

Range in characteristics. The depth of the soil to weathered volcanic rock is 15 to 20 inches. The base saturation of the epipedon is 50 to 75 percent. Rock fragments range from 35 to 65 percent.

The A horizon has colors of 10YR 5/2, 5/3, or 4/3. It is gravelly sandy loam, gravelly loam, and extremely gravelly coarse sandy clay loam. Reaction is slightly acid to neutral.

The Franktown soils in this survey area are a taxajunct to the Franktown series because it has neutral reaction in the lower A horizon, it does not have a C horizon, and it has less than 50 percent rock fragments in the A horizon. This difference, however, does not significantly affect use and management.

FUGAWEE SERIES

The Fugawee series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rocks, principally latite and andesite flows. Slopes range from 2 to 75 percent.

The vegetation is mainly high elevation mixed conifer, consisting of red fir, white fir, Jeffrey pine, lodgepole pine, and an understory o f mountain whitethorn, greenleaf manzanita, prostrate manzanita, and squaw carpet. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is about 38 to 46 degrees F, and the average frost-free season is 30 to 80 days.

Permeability is moderate to moderately slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Fugawee soils are similar to the Boomer, Cohasset, and Crozier soils and associated with the Jorge, Kyburn, Sierraville, Tahoma, and Trojan soils. Boomer, Cohasset, and Crozier soils have a mesic soil temperature regime. Jorge, Sierraville, Tahoma, and Trojan soils are over 40 inches deep. Kyburz soils have mean annual precipitation between 18 to 35 inches and a base saturation of 50 to 75 percent in the argillic horizon.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Fugawee sandy loam in a unit of Fugawee-Tahoma complex, 2 to 30 percent slopes, in the NE1/4NE1/4 of section 15, T. 16 N., R. 16 E.

O 1 inch to 0; needles and twigs.

A11 0 to 2 inches; dark brown (7.5YR4/2) sandy loam. dark brown (7.5YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky arid nonplastic; many very fine roots; many very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 2 to 7 inches; brown (7.5YR. 5/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, common fine roots, few medium roots; many very fine interstitial pores; 10 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B1t 7 to 13 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure parting to moderate line and very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, and few fine, medium, and coarse roots; many very fines interstitial pores; few thin clay films as bridges between mineral grains; 10 percent pebbles, 5 percent cobbles; medium acid (pH 5.7); clear wavy boundary.

B2lt 13 to 22 inches; reddish brown (5YR 5/3) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores; common thin clay films as bridges between mineral grains and on faces of peds; 15 percent pebbles, 5 percent cobbles, 5 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B22t 22 to 35 inches; light reddish brown (5YR 6/3) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate line subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine interstitial pores, few fine tubular pores; many thin clay films on faces of peds and lining pores; 20 percent pebbles, 10 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Cr 35 inches; fractured, weathered andesite.

Range in characteristics. Thickness of the solum ranges from 20 to 40 inches.

The A horizon has dry color of 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/2, 5/3, 5/4; 7.5YR 3/2, 4/2, 5/2, or 5/4 and moist color of 10YR. 3/2, 4/3; 7.5YR 3/2, 3/4; 5YR. 2.5/2, 3/2, 3/3, or 3/4. The darker values and lower moist chromas are in the surface few inches. It is loam or sandy loam and it contains 10 to 25 percent gravel and 3 to 10 percent cobbles and stones. It has weak granular or subangular blocky structure and is strongly acid to slightly acid.

The B2t horizons has dry color of 10YR 3/4, 4/2, 4/3, 4/4, 5/3; 7.5YR 3/2, 4/2, 4/4, 5/2, 5/4, 6/4; 5YR 5/3, or 6/3 and moist color of 10YR 3/2, 3/4,; 7.5YR 3/4, 4/4, 5/4,6/4; 5YR 3/4, or 4/4. It is clay loam, or sandy clay loam and contain 10 to 30 percent gravel , and 2 to 10 percent cobbles and stones. It has weak or moderate subangular and angular blocky structure and is strongly acid to medium acid.

FUGAWEE VARIANT

Fugawee Variant soils consist of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rocks, principally latite and andesite flows. Slope ranges from 2 to 75 percent.

The vegetation is mainly Wyethia, big sagebrush, and widely scattered Jeffrey pine and white fir. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is 38 to 46 degrees F., and the average frost free season is 30 to 80 days.

Permeability is slow. Available water capacity is very low, runoff is medium, and the erosion potential is high.

The Fugawee Variant soils are similar and associated with the Fugawee soils. Fugawee soils are over 20 inches deep.

Taxonomic class. These soils are loamy, mixed, frigid, shallow Ultic Haploxeralfs.

Typical pedon of Fugawee Variant loam in a unit of Pugawee Variant-Fugawee complex, 2 to 30 percent slopes, approximately 100 yards from the watershed break between Martis and Juniper Creeks at the Placer/Nevada County line near the NE corner 23, T. 17 N., R. 17 E.

Al 0 to 3 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and slightly plastic; common very fine roots, few medium roots; many very fine interstitial pores; 2 percent pebbles, 3 percent cobbles; neutral (pH 6.7); gradual wavy boundary.

A12 3 to 5 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine roots, few fine and medium roots; many very fine interstitial pores; few thin clay films as bridges between mineral grains; 5 percent cobbles; slightly acid (pH 6.5) clear smooth boundary.

B21t 5 to 13 inches; dark brown (7.5YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores; many thin clay films as bridges between mineral grains and lining pores; 3 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); gradual smooth boundary.

B22t 13 to 18 inches; dark brown (10YR 4/3) cobbly clay loam, dark yellowish brown (10YR 3/4) moist; modrate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores, few very fine tubular pores; many thin clay films as bridges between mineral grains and lining pores; 5 percent pebbles, 10 percent cobbles; strongly acid (pH 5.7); clear wavy boundary.

Cr 18 inches; weathered andesitic rock fractures 5 to 7 inches apart.

Range in characteristics. Depth to weathered volcanic rock is 15 to 20 inches. Surface stones are 5 to 60 percent.

The A horizon has dry colors of 7.5YR 3/2, 4/2, 5/2, or 10YR 4/3 and moist colors of 7.5YR 3/2, 10YR 3/2, or 3/3. It is loam or silty loam and gravel is 2 to 5 percent, cobbles are 3 to 5 percent and stones are 0 to 5 percent. It is slightly acid to strongly acid.

The B2t horizon has dry colors of 7.5YR 4/4, 5/4, 10YR 4/2, or 4/5 and moist colors of 10YR 3/2 or 3/4. Textures are loam and clay loam. gravel is 3 to 5 percent, cobbles are 5 to 10 percent. It is slightly acid to strongly acid.

GEFO SERIES

The Gefo series consists of deep, somewhat excessively drained soils in alluvial fans and outwash plains. The soils formed in glacial outwash and alluvium. Slope ranges from 2 to 30 percent.

The vegetation is mainly dense stands of lodgepole pine with an understory of brush and perennial grasses. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 35 to 50 inches, the average annual air temperature is 40 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is rapid to very rapid. Available water capacity is low to moderate, runoff is slow, and the erosion potential is high.

The Gefo soils are similar to the Gefo Variant, Zeibright, and associated with the Celio soils. Gefo Variant soils are coarse-loamy. Zeibright soils have mesic temperature regimes and are loamy-skeletal. Celio soils are skeletal and have udic soil moisture regimes.

Taxonomic class. These soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Gefo loamy sand in a unit of Gefo-Aquoll-Celio complex, 2 to 9 percent slopes about 0.75 mile northeast of Webber Peak iu the center of section 20, T. 19 N., R. 14 E.

O1 Trace; litter and duff

A11 0 to 6 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

A12 6 to 15 inches; brown (l0YR. 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

Cl 15 to 30 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C2 30 to 40 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (l0YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C3 40 to 60 inches; pale brown (10YR. 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic few very fine roots; many very fine and fine interstitial pores; 10 percent pebbles; medium acid (pH 6.0).

Range in characteristics. A thin O horizon is present near trees. The solum is 10 to 15 inches thick.

The A horizon has colors of 10YR 5/2, 5/3, 4/3, or 4/2. It is loamy sand to coarse sand with 0 to 30 percent gravel, and is medium acid to slightly acid.

The C horizon has colors of 10YR 7/4, 7/3, 6/4, 6/3, or 5/3. Textures range from loamy sand through coarse sand and have from 5 to 30 percent gravel.

GEFO VARIANT

Gefo Variant soils consists of deep, well drained soils on alluvial fans. These soils formed in alluvium. Slope ranges from 2 to 15 percent.

The vegetation is mainly grass with scattered Wyethia. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 38 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderatley rapid. Available water capacity is low to high, runoff is medium, and the erosion potential is moderate.

The Gefo Variant soils are similar to the Celio, Gefo, and Tallac soils. The Celio soils are sandy-skeletal, the Gefo soils are sandy, and the Tallac soils are loamy-skeletal.

Taxonomic class. These soils are coarse-loamy, mixed, frigid Pachic Xerumbrepts.

Typical pedon of Gefo Variant in a unit of Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes, about 0.75 mile southwest of Mt. Disney in the NW1/4 of section 2, T. 16N., R. 14 E.

A11 0 to 10 inches; grayish brown (10YR. 5/3) very fine sandy loam, dark brown (7.5YR 3/2) moist; strong very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; strongly acid (pH 5.5); clear smooth boundary.

A12 10 to 22 inches; dark brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR. 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; 5 percent gravels; medium acid (pH 6.0); clear wavy boundary.

A13 22 to 33 inches; brown (10YR 5/3) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure parting to weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few medium roots; many very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

A14 33 to 43 inches; pale brown (l0YR 6/3) very fine sandy loam, dark yellowish brown (l0YR 4/4) moist; weak fine and medium subangular blocky structure soft, very friable, nonsticky and slightly plastic; few very fine roots; many very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

Cl 43 to 61 inches; light yellowish brown (l0YR 6/4) loam, dark yellowish brown (10YR 4/4) moist, common distinct medium strong brown (7.5YR 5/6 and 5/8) moist mottles; massive; soft1 very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular pores, many very fine interstitial pores, and few medium interstitial pores; 5 percent gravel; strongly acid (pH 5.5).

Range in characteristics. Depth ranges from 40 to 90 inches. The solum is 10 to 43 inches thick. Textures throughout the soil profile are sandy loam, fine sandy loam, very fine sandy loam, loam with 5 to 40 percent gravel. It is slightly acid to strongly acid.

The upper A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, or 7.5YR 4/4. In addition to these colors, the lower A horizon also has dry color of 10YR 5/4 or 6/3.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/6.

HAYPRESS SERIES

The Haypress series consists of deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly open stands of mixed conifers, consisting of Jeffrey pine and ponderosa pine with manzanita and scattered sagebrush. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 20 to 25 inches, the average annual air temperature is about 45 to 47 degrees F., and the average frost-free season is 30 to 65 days.

Permeability is rapid. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is high.

The Haypress soils are similar to the Bucking, Chaix, and Gefo soils and associated with the Toiyabe soils. Bucking soils have umbric epipedons. Chaix soils have a mesic soil temperature regime sad are less than 40 inches deep. Gefo soils are formed in glacial outwash and alluvium, do not have a lithic or paralithic contact and have umbric epipedons. Toiyabe soils are less than 20 inches deep.

Taxonomic class. These soils are sandy, mixed, frigid Entic Haploxerolls.

Typical pedon of Haypress loamy coarse sand in a unit of Haypress-Toiyabe complex, 2 to 30 percent slopes, 1,100 feet southwest of the east quarter corner of sec. 4, T. 21 N., R. 14 E.

O1 and O2 3 inches to 0; fresh and partly decomposed litter of pine needles, twigs and leaves; abrupt smooth boundary.

A11 0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark gray (10YR 3/1) moist; weak thick platy structure parting to weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular and interstitial pores; medium acid (pH 6.0); clear smooth boundary.

A12 4 to 14 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots, many medium and coarse roots; common very fine tubular and interstitial pores, few medium tubular and interstitial pores; medium acid (pH 6.0); clear smooth boundary.

AC 14 to 28 inches; brown (10YR 5/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many medium and coarse roots; common very fine tubular and interstitial pores; medium acid (pH 6.0); gradual smooth boundary.

Cl 28 to 49 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; many medium and coarse roots; common very fine tubular pores, few medium tubular pores, and common very fine interstitial pores; medium acid (pH 6.0); clear smooth boundary.

C2r 49 inches; weathered granitic rock, crushes to pale brown (10YR 6/3).

Range in characteristics. Depth to weathered granitic rock ranges from 40 to 60 inches. Textures are loamy sand or loamy coarse sand throughout and it is slightly acid to medium acid.

The A horizon has dry colors of l0YR 5/3, 5/2, 5/1, 4/3, 4/2, or 4/1 and moist colors of l0YR 3/3, 3/2, 3/1, 2/2, or 2/1

The C horizon has dry colors of I0YR 6/4, 6/3, or 5/4 and moist colors of 10YR 4/4, 4/3, or 3/4.

HODA SERIES

The Hoda series consists of deep to very deep, well drained soils on mountainsides; These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods. consisting of Douglas-fir, ponderosa pine, incense cedar, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., and the average frost-free season is 180 to 230 days.

Permeability is slow. Available water capacity is low to high, runoff is medium, and the erosion potential is high to very high.

The Hoda soils are similar to the Aiken, Jocal, Sierraville, and Sites soils, and associated with the Holland, Hotaw, and Musick soils. Aiken, Jocal, and Sites soils have less than 35 percent base saturation in their argillic horizons. Holland and Musick soils are fine-loamy and the Musick soils have 2.5YR hues in the argillic horizon. Hotaw soils are less than 40 inches deep. Sierraville soils have a frigid soil temperature regime.

Taxonomic class. These soils are fine, kaolinitic, mesic Ultic Haploxeralfs.

Typical pedon of Hoda loam in a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 4 miles west of Camptonville in the SE 1/4 SE1/4 of section 6, T. 18 N., R. 8 E.

O1 1 inch to 0; litter and duff.

Al 0 to 7 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

B1t 7 to 14 inches; reddish yellow (5YR 6/6) loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; few thin clay films coating mineral grains; slightly acid (pH 6.5); clear smooth boundary.

B21t 14 to 21 inches; yellowish red (5YR 5/8) clay, yellowish red (5YR 4/6) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds and moderately thick clay films lining pores; slightly acid (pH 6.5); gradual wavy boundary.

B22t 21 to 48 inches; reddish yellow (5YR 6/8) clay, yellowish red (5YR 5/8) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; medium acid (pH 6.0); clear irregular boundary.

B3t 48 to 72 inches; reddish yellow (7.5YR 6/8) clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; few very fine interstitial pores; few thin clay film lining pores; medium acid (pH 6.0).

Range in characteristics. Thickness of the solum ranges from 40 to 80 inches and paralithic contacts do not occur above 80 inches.

The A horizon has dry colors of 10YR 5/2, 5/3, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, or 4/4 and moist colors of 10YR 4/2, 4/3, 3/3, 3/4, 4/4, 7.5YR. 4/2, 4/4, 5/6, or 5/8. It is sandy loam or loam and is slightly acid to medium acid.

The B2t horizons have colors of 7.5YR 8/6, 7/8, 7/6, 6/8, 6/6, 5YR 7/8, 716, 6/8, 6/6, 5/8, 5/6, or 4/6. It is clay loam or clay and is slightly acid to strongly acid.

HOLLAND SERIES

The Holland series consists of very deep, well drained soils on mountainsides. These soils formed in residunm weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., and the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is high to very high.

The Holland soils are similar to the Boomer, Cohasset, local, and Tahoma soils and associated with the Hoda, Hotaw, and Musick soils. Boomer, Cohasset, and Jocal soils have less than 20 percent coarse and very coarse sand. Hoda soils have more than 35 percent clay in the argillic horizon. Hotaw soils are less than 40 inches deep. Musick soils have 2.5YR hues in the argillic horizon. Tahoma soils have a frigid soil temperature regime and have volcanic parent material.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Holland loam is from a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 6 miles west of Camptonville in the SW1/4 NW1/4 of section 36, T. 19 N., R. 7 E.

O1 2 inches to 0; litter and duff.

Al 0 to 4 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak very fine and fine granular structure; soft, friable, nonsticky and plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary.

A3 4 to 15 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and plastic; few medium and coarse roots, common fine roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

B21t 15 to 35 inches; reddish yellow (5YR 6/8) clay loam, yellowish red (5YR 4/8); moderate fine subangular blocky structure; hard, firm, nonsticky and plastic; few fine, medium, and coarse roots; common fine and very fine interstitial pores; common thin clay films on faces of peds and lining pores; medium acid (pH 6.0); clear wavy boundary.

B22t 35 to 50 inches; reddish yellow (7.5YR 6/8) clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse roots; common very fine and fine interstitial pores, common fine tubular pores; common thin clay films as bridges between mineral grains; medium acid (ph 6.0); gradual irregular boundary.

B3t 50 to 65 inches; reddish yellow (7.5YR. 7/8) clay loam, reddish yellow (7.5YR 6/8) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium roots; common very fine and fine interstitial pores; common thin clay films as bridges between mineral grains; strongly acid (pH 5.5).

Range in characteristics. Depth to weathered bedrock is 60 to 100 inches.

The Al horizon has colors of 10YR 5/3, 5/2, 4/3, 4/2, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, or 3/2. Moist chromas can be 2 or 3 in the upper A but increase to 4 at a depth of 7 to 10 inches but is 4 throughout in some pedons. It is sandy loam or loam and is slightly acid to medium acid.

The B2t horizons has colors of 7.5YR 6/8, 6/6, 6/4, 5/8, 5/6, 5/4, 4/6, 4/4, 5YR 6/8, 6/6, 5/8, 5/6, 5/4, 4/6, or 4/4. It is sandy clay loam or clay loam and is slightly acid to strongly acid.

HORSESHOE SERIES

The Horseshoe series consists of deep and very deep, well drained soils on river terraces. These soils formed in isolated bodies of Eocene river gravel. Slope ranges from 2 to 60 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Elevation is 2,500 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 50 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Horseshoe soils are similar to the Aiken and Sites soils and associated with the Hurlbut, Huysink, Jocal, and Mariposa soils. Aiken and Sites soils contain more than 35 percent clay in the textural control section. Hurlbut and Mariposa soils are less than 40 inches deep, and Mariposa soils have a lithic contact intermittently above 20 inches in part of each pedon. Huysink soils are skeletal. Jocal soils have low organic carbon in the surface layer and have metasedimentary parent material.

Taxonomic class. These soils are fine-loamy, mixed, mesic Xeric Haplohumults.

Typical pedon of Horseshoe loam in a unit of Horseshoe-Jocal-Mariposa complex, 2 to 30 percent slopes, near the intersection of Gas Canyon and Yuba Close Roads in Cascade Shores subdivision on the south side of Scotts Flat Reservoir in section 7, T. 16 N., R. 10 E.

Al 0 to 3 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

A3 3 to 9 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular pores, common very fine and line interstitial pores; few thin clay films on faces of peds; 20 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

B1t 9 to 15 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5Th 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine and fine interstitial pores; few thin clay films on faces of peds; 15 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B21t 15 to 24 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots, few coarse roots; common very fine and fine interstitial pores; common thin clay films on faces of peds; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B22t 24 to 32inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few medium roots; common fine and medium tubular and interstitial pores; common moderately thick clay films on faces of peds, common thin clay films lining pores; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B3t 32 to 55 inches; yellowish red (5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; massive; hard, firm, sticky and plastic; few medium roots; common few and medium tubular and interstitial pores; many thick clay films lining pores; 30 percent pebbles, 5 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

IIC 55 to 65 inches; highly weathered stratified silt stone and clay stone; iron and clay stains and coatings on rock fragments, dark red (2.5YR 3/6) moist.

Range in characteristics. Solum thickness is 40 to 80 inches thick. The A horizon has dry colors of 7.5YR 4/4 and moist chromas of 4 or more below 3 inches, It is loam or sandy loam and slightly acid or medium acid. Gravel content ranges from 5 to 20 percent.

The B horizon has colors of 7.5YR 6/6, 6/4, 5/6, 5/4, 4/6, 4/4, 5YR 6/6, 5/6, 5/4, 4/6, or 4/4. It is clay loam or loam and is medium acid or strongly add. Gravel

content ranges from 15 to 30 percent and cobbles from 0 to 5 percent.

The Horseshoe soils in map units HSE and HSF in this survey area are a taxajunct to the Horseshoe series because of 10YR colors in the A horizon and 7.5YR colors in the B horizon. This difference, however, does not significantly affect use and management.

HOTAW SERIES

The Hotaw series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, Douglas-fir, white fir, black oak, tan oak, and madrone. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to low, runoff is medium to rapid, and the erosion potential is high to very high.

The Hotaw soils are similar to the Crozier and Fugawee soils and associated Chaix, Chawanakee, Hoda, Holland, and Musick soils. Chaix and Chawanakee soils do not have argillic horizons and are less than 20 inches deep. Crozier and Fugawee soils are formed from volcanic rock and the Fugawee soils have a frigid soil temperature regime. Hoda, Holland, and Musick soils are over 40 inches deep.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hotaw loam in a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 3 miles west of Camptonville in the center of section 6, T. 18 N., 11. 8 E.

O1 1 inch to 0; litter and duff.

A11 0 to 4 inches; brown (7.5YR 5/4) loam, brown (7.5YR. 4/4) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

A12 4 to 12 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak moderate subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; many very fine and fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

B2t 12 to 34 inches; light yellowish brown (l0YR 6/4) sandy clay loam, yellowish brown (l0YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots, many coarse roots; common very fine and fine tubular pores; common moderately thick clay films lining pores; medium acid (pH 6.0); clear wavy boundary.

Cr 34 inches; weathered granitic rock.

Range in characteristics. Depth to weathered rock ranges from 20 to 40 inches.

The A horizon has colors of 10YR 6/4, 5/8, 5/6, 5/4, 5/3, 4/3, 7.5YR 6/4, 5/4, 5/2, 4/4, or 4/2. The dry value is 6 below seven inches. It is slightly acid to medium acid and is loam, sandy loam, or coarse sandy loam.

The B2t horizon has colors of 10YR 6/4, 5/3, 4/3, 7.5YR. 6/4,5/8, 5/6, 5/4, 5/2, 4/6, 4/4, or 4/2. It is sandy clay loam or clay loam and slightly acid to strongly acid.

HOTAW VARIANT

The Hotaw Variant consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly high elevation mixed conifers, consisting of red fir and white fir with an understory of manzanita and chinquapin. Elevation is 5,500 to 6,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 52 to 56 degrees F, the average frost-free season is 150 to 175 days.

Permeability is moderately slow. Available water capacity is low, runoff is medium, and the erosion potential is high to very high.

The Hotaw Variant soils are similar to the Crozier, Fugawee, and Hotaw soils, and associated with the Chaix Variant and Tahoma Variant soils. Chaix Variant soils do not have argillic horizons. Crozier and Hotaw soils have a mesic soil temperature regime. Fugawee soils have greater than 35 percent base saturation in the argillic horizon. Tahoma Variant soils are over 40 inches deep.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Hotaw Variant in a unit of Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes, on the road to Murphy Flat, in the NE1/4 NW1/4 of section 23, T. 18 N., R. 11 E.

O1 1 inch to 0; needles and duff.

Al 0 to 4 inches; brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

B2t 4 to 11 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and medium roots, few coarse roots; common very fine and fine tubular and interstitial pores; common thin clay films lining pores and on faces of peds; few moderately thick clay films lining pores; 25 percent pebbles; medium acid (pH 5.7); gradual smooth boundary.

B3t 11 to 38 inches; yellow (10YR 8/6) gravelly clay loam, yellow (10YR 7/8) moist; massive; slightly hard, friable, slightly sticky and plastic; few coarse roots; common very fine and fine interstitial pores, few fine tubular pores; few thin clay films as bridges between mineral grains; 15 percent pebbles; very strongly acid (pH 5.0); gradual irregular boundary.

Cr 38 inches; weathered granitic rock.

Range in characteristics. Depth to weathered rock ranges from 20 to 40 inches. Gravel ranges from 15 to 30 percent throughout the profile.

The A horizon has colors of 10YR 5/4, 5/3, 4/4, 4/3, 7.5YR4/4, or 3/4 with moist chromas of 4 or more below 4 inches. it is loam or sandy loam and is slightly acid.

The B2t horizon has colors of 7.5YR 6/6, 6/4, 5/6, 5/4, 4/6, or 4/4. It is clay loam or loam and medium acid to very strongly acid.

HURLBUT SERIES

The Hurlbut series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-open stands of mixed confiers and brush, consisting of ponderosa pine, sugar pine, white fir, dwarf tan oak, chinquapin, manzanita, and ceanothus. Elevation is 2,000 to 5,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F., and the average frost free season is 100 to 200 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Hurlbut soils are similar to the Chaix, Mariposa, and Smokey soils. They are associated with the Deadwood soils. Chaix soils have granitic parent material and are coarse-loamy. Deadwood soils are less than 20 inches deep to a lithic contact and are skeletal. Mariposa soils are fine-loamy and have a lithic contact intermittently above 20 inches. Smokey soils have a frigid soil temperature regime and are skeletal.

Taxonomic class. These soils are fine-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Hurlbut gravelly loam in a unit of Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes, about 23 miles northeast of Foresthill, 0.2 miles east of the intersection of American Hill Road and Secret Ridge Road; near the NE1/4 NE1/4 of section 12, T. 15 N., R. 12 E.

O1 2 inches to 0; litter and duff.

Al 0 to 4 inches; reddish yellow (7.5YR 6/6) gravelly loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky and granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine and very fine interstitial pores; 20 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

B21 4 to 17 inches; reddish yellow (7.5YR 7/8) gravelly silt loam, strong brown (7.5YR 5/8) moist; moderate medium and fine angular blocky structure; slightly hard, friable, sticky and slightly plastic; common medium and coarse roots; common fine interstitial and tubular pores; 20 percent pebbles; many thin clay films lining pores; medium acid (pH 5.7); gradual wavy boundary.

B22 17 to 27 inches; reddish yellow (7.5YR. 7/8) silt loam, reddish yellow (7.5YR 6/8) moist; weak medium angular blocky structure; slightly hard, friable, sticky and slightly plastic; common medium and coarse roots; common fine interstitial and tubular pores; 10 percent pebbles; common thin clay films lining pores; medium acid (pH 5.7); clear smooth boundary.

Cr 27 inches; weathered metamorphosed sedimentary rock; few medium and coarse roots in fractures.

Range in characteristics. Depth to a paralithic contact ranges from 20 to 40 inches. Most profiles have 0 to 30 percent gravel with the larger amounts in the uppermost horizons. Base saturation throughout the soil is 30 to 50 percent.

The A horizon has dry colors of 5YR 3/4, 7.5YR 4/6, 5/4, 5/6, 6/4, 6/6, 10YR 4/3, or 6/4 and moist colors of 5YR 5/6, 4/6, 7.5YR. 3/2, 3/4, 4/4, 4/6, l0YR 3/2, or 4/3. It is gravelly loam, gravelly sandy loam, or gravelly fine sandy loam. Structure is subangular blocky or granular.

The B horizon has dry colors of 5YR 4/6; 4/4, 5/6, 6/6, 7.5YR 5/6, 7/8, 10YR 5/4, 6/6, or 6/8 and moist colors of 5 YR 4/6, 3/4, 5/6 7.5YR 6/8, 5/8, 4/6, 4/4, or 10YR 6/6. It is silt loam, gravelly silt loam, or gravelly loam. Structure is weak or moderate, fine or medium angular blocky.

HUYSINK SERIES

Huysink soils are deep and very deep, well drained soils on outwash terraces. These soils formed in deposits of glacial till and outwash derived from a mixture of parent materials. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 56 degrees F., and the average frost-free season is 100 to 150 days.

Permeability is moderate. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is moderate to high.

The Huysink soils are similar to the Euer, Euer Variant, Lorack, and Martis soils and associated with the Horseshoe soils. Euer and Martis soils have umbric epipedons and a frigid soil temperature regime. Euer Variant soils are not skeletal and have a frigid temperature regime. Horseshoe soils are not skeletal. Lorack soils have a frigid soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Xeric Haplohumults.

Typical pedon of Huysink gravelly sandy loam in a unit of Huysink-Horseshoe complex, 2 to 30 percent slopes; 1.9 miles south of Emigrant Gap, 1.2 miles along road from Sailor Point to Carpenter Flat, west end of clearcut, 400 feet west of road; 650 feet north of center of NW1/4 of sec. 7, T. 16 N., R. 12 E.

O1 1 inch to 0; fresh and decomposed needles and leaves.

All 0 to 2 inches; dark yellowish brown (10YR 4/4) very stony loam, very dark grayish brown (l0YR 3/2) moist; weak fine granular structure; soft very friable, nonsticky and slightly plastic; common very fine and fine roots; many very fine interstitial pores and few fine tubular pores; 15 percent pebbles, 5 percent cobbles, 25 percent stones; slightly acid (pH 6.5); abrupt smooth boundary.

A12 2 to 7 inches; brown (7.5YR 4/4) very stony loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores and few fine tubular pores; 10 percent pebbles, 10 percent cobbles, 25 percent stones; slightly acid (pH 6.5); clear wavy boundary.

B1 7 to 14 inches; strong brown (7.5YR 5/6) very stony loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores and few fine tubular pores; common thin clay films in pores; 20 percent pebbles, 10 percent cobbles, 25 percent stones; slightly acid (pH 6.5); clear wavy boundary.

B2lt 14 to 29 inches; strong brown (7.5YR 5/6) extremely stony loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, very friably plastic; many very fine and fine roots, common medium roots; many very fine interstitial pores and common fine tubular pores; common thin clay films lining pores; 50 percent pebbles, 10 percent cobbles, 25 percent stones; medium acid (pH 6.0); clear wavy boundary.

B22t 29 to 41 inches; reddish yellow (7.5YR 6/6) extremely stony loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium and coarse roots; many very fine interstitial pores and common fine tubular pores; common thin clay films on faces of peds and lining pores; 30 percent pebbles, 5 percent cobbles, 25 percent stones; medium acid (pH 5.7); abrupt wavy boundary.

B3lt 41 to 58 inches; brownish yellow (10YR 6/6) very stony loam, dark yellowish brown (10YR 4/6)) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium roots and few coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds and lining pores; 30 percent pebbles, 3 percent cobbles, 25 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B32t 58 to 69 inches; yellow (10YR 7/6) extremely stony loam, yellowish brown (10YR 5/6) moist; modelate medium subangular blocky structure; sligntly hard, friable, nonsticky and slightly plastic; common medium roots and few coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds and lining pores; 35 percent pebbles, 3 percent cobbles, 25 percent stones; very strongly acid. (pH 4.5)

Range in characteristics. The solum is 40 to 65 inches thick.

The A horizon has dry color of 10YR 4/3, 4/4, 5/3, 5/4, 7.5YR 4/2, 4/4, 5/2, or 5/4 and moist color of l0YR 3/2, 3/3, 3/4, 4/3, 4/4, 7.5YR 4/2, 4/4, or 3/2. Moist chromas of 4 are found below the upper 7 inches of the A horizon. Structure is granular in the upper portion of the A and subangular blocky in the lower portions. Rock fragment content ranges from 10 to 50 percent. It is slightly acid or medium acid.

The B2t horizon has dry color of 10YR 6/6, 6/8, 7/6, 7.5YR 5/6, 5/8, 6/6, 6/8, or 7/8 and has moist color of 10YR 5/6, 5/8, 7.5YR 4/4, 5/6, 5/8, 6/6, or 6/8. It is loam, clay loam, or sandy clay loam. Rock fragment content ranges from 50 to 85 percent. Structure is subangular blocky or massive and it is medium acid to very strongly acid.

INVILLE SERIES

The Inville soils consist of deep, well drained soils on outwash terraces. These soils formed in deposits of Donner glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly bitterbrush and open conifer stands, consisting of Jeffrey pine and ponderosa pine. Elevation is 5,500 to 6,300 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is slow, and the erosion potential is moderate.

The Inville soils are similar to the Jorge, Martis, Sattley, Tallac, and Zeibright soils and associated with the Euer and Martis Variant soils. Euer soils are not cobbly. Jorge soils are greater than 40 inches deep to volcanic parent material. Martis soils are not skeletal. Martis Variant soils have dense, root restricting sub-surface horizons. Tallac soils have silica cemented pans below 40 inches. Sattley soils have mollic epipedons. Zeibright soils have a mesic soil temperatures regimes.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Inville cobbly coarse sandy loam in a unit of Inville-Martis Variant complex, 2 to 5 percent slopes, near the Truckee Airport in section 7, T. 17 N., R. 17 E.

Al 0 to 6 inches; grayish brown (10YR 5/2) cobbly coarse sandy loam, very dark grayish brown (l0YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent cobbles and stones; strongly acid (pH 5.5); gradual wavy boundary.

B2t 6 to 14 inches; yellowish brown (10YR 5/4) very cobbly coarse sandy loam, dark brown (l0YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; few fine and medium roots; many fine interstitial pores; few thin clay films on faces of peds; 35 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B3 14 to 30 inches; light yellowish brown (10YR 6/4) very cobbly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium roots, very few coarse roots; many fine interstitial pores; 50 percent cobbles and stones; slightly acid (pH 6.5).

O 30 to 60 inches; Similar to the above but extremely cobbly.

Range in characteristics. Effective rooting depth ranges from 30 to 40 inches.

The A horizon has colors of 10YR 5/2, 4/2, 3/2, or 2/2. It is coarse sandy loam or sandy loam with 15 to 35 percent cobbles and gravel and is medium acid or strongly acid.

The B2t horizon has dry colors of 10YR 5/4, 5/6, 5/8, or 6/4 and moist colors of 10YR 5/3, 4/3, 4/4, 3/3, or 3/4. it is sandy loam or coarse sandy loam and cobbles and gravel range from 25 to 50 percent but average greater than 35 percent by volume throughout the B horizon. Reaction is slightly acid or medium acid.

The Inville soils in this survey area are a taxajunct to the Inville series because the B2t horizon has colors of 10YR. This difference, however, does not significantly affect use and management.

JOCAL SERIES

The Jocal series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metamorphic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar with black oak and madrone. Elevation is 1,800 to 5,000 feet. The average annual precipitation is about 45 to 70 inches, the average annual air temperature is 54 to 60 degrees F, and the average frost-free season is 150 to 225 days.

Permeability is moderatly slow. Available water capacity is low to high, runoff is medium to rapid, and the erosion potential is moderate to high.

The Jocal soils are similar to the Cohasset, Holland, and Tahoma soils. They are associated with the Mariposa and Sites soils. Cohasset and Tahoma soils are formed on volcanic parent material and Tahoma soils have a frigid soil temperature regime. Holland soils have more than 20 percent coarse and very coarse sand. Mariposa soils are less than 40 inches deep and have a lithic contact intermittently above 20 inches inpart of each pedon. Sites soils contain more than 35 percent clay in the textural control section.

Taxonomic class. These soils are fine-loamy, mixed, mesic Typic Haploxerults.

Typical pedon of Jocal loam in a unit of Sites-Jocal complex, 2 to 30 percent slopes, approximately 14 miles north-northeast of Grass Valley one-quarter mile west of the intersection of Bear Trap Road and Tyler Foote Crossing Road, 1320 feet north and 1000 feet west of the south quarter corner of section 21, T. 18 N., R. 9 E.

O1 and O23 inches to 0; needles, litter and duff.

Al 0 to 6 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and coarse roots; many very fine and fine tubular pores; slightly acid; clear smooth boundary.

A3 6 to 18 inches; reddish brown (5YR 5/4) gravelly loam, yellowish red (5YR 4/6) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine tubular and interstitial pores and few fine and medium tubular pores; medium acid; gradual wavy boundary.

B21t 18 to 34 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine tubular and interstitial pores and common fine tubular pores; common thin clay films on faces of peds and lining pores; medium acid; gradual smooth boundary.

B22t 34 to 51 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; moderate fine and medium angular blocky structure; hard, firm, slightly sticky and plastic; few medium and coarse roots; many very fine tubular pores; many thin clay films on faces of peds and lining pores; strongly acid; gradual smooth boundary.

B3 51 to 70 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; few very fine tubular pores; many thin clay films lining pores; strongly acid; gradual smooth boundary.

Cr 70 inches; variegated strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) weathered slate and shale; yellowish red (5YR 5/8) and red (2.5YR 4/6) moist; strongly acid.

Range in characteristics. Depth to slate or shale ranges from 40 to 70 inches. The slate or shale is usually weathered, but in places it changes abruptly to unweathered slate or shale. Cobble content ranges from 0 to 25 percent.

The A horizon has colors of 10YR 5/8, 5/6, 5/4, 5/3, 4/3, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/4, or 4/3. It is massive or has weak granular structure and gravel content ranges from 0 to 35 percent.

The B2t horizon has colors of 7.5YR 5/6, 4/6, 5YR 7/6, 6/6, 5/6, 4/6, 2.5YR 5/6, or 4/6. This horizon is clay loam, gravelly clay loam, or silty clay loam.

Overlying the slightly weathered slate and shale in places is a C horizon. It has variegated colors of 7.5YR 5/6 and 5YR 5/8.

JOCAL VARIANT

Jocal Variant soils consist of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rocks. Slope ranges from 50 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar, white fir with black oak, live oak, and big leaf maple. Elevation is 2,000 to 5,000 feet. The average annual precipitation is about 45 to 65 inches, the average annual air temperature is 52 to 60 degrees F., and the average frost free season is 125 to 225 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is rapid, and the erosion potential is high.

The Jocal Variant soils are similar to the Aiken, Jocal, and Sites soils and are associated with the Deadwood, Hurlbut, and Mariposa soils. All of these soils are not skeletal, except the Deadwood soils. Aiken and Sites soils are clayey. Deadwood soils are less than 20 inches deep to a lithic contact. Hurlbut and Mariposa soils are less than 40 inches deep and Mariposa soils have a lithic contact intermittently above 20 inches in part of each pedon.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Jocal Variant gravelly silt loam in a unit of Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, along the Gaston Road, section 6, T. 17 N. , R. 11 E.

O1 1 inch to 0; needles, litter and duff.

Al 0 to 5 inches; light brown (7.5YR 6/4) gravelly silt loam, dark brown (7.5Th 4/4) moist; weak very fine and fine granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots and few medium roots; many very fine interstitial pores and few very fine tubular pores; 25 percent pebbles; slightly acid (pH 6.5); clear smooth boundary.

B1t 5 to 11 inches; reddish yellow (7.5YR 6/6) very gravelly clay loam, strong brown (7.5YR 4/6) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine and medium roots; common very fine interstitial pores and few very fine tubular pores; common moderately thick clay films as bridges between mineral grains, common thin clay films lining pores, and few thin clay films as bridges between mineral grains; 50 percent pebbles; slightly acid (pH 6.3); gradual wavy boundary.

B2lt 11 to 25 inches; reddish yellow (5YR7/6) very gravelly clay loam, yellowish red (5YR5/6) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and coarse roots, common fine and medium roots; common very fine interstitial pores and few very fine tubular pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 45 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 25 to 44 inches; reddish yellow (7.5YR 7/6) very gravelly clay loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic, few fine, medium, and coarse roots; few very fine interstitial and tubular pores; many moderately thick clay films as bridges between mineral grain sand common thin clay films lining pores; 50 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B23t 44 to 61 inches; reddish yellow (7.5YR 7/6)very gravelly clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few very fine tubular and interstitial pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 40 percent pebbles; strongly acid (pH 5.5); diffuse irregular boundary.

B3t 61 to 65 inches, reddish yellow (7.5YR 7/6) extremely gravelly sil tloam, yellowish red (5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine tubular and interstitial pores; common moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 3 percent cobbles and 65 percent pebbles; strongly acid (pH 5.5).

Range in characteristics. The solum is 40 to 80 inches thick.

The A horizon has dry color of 10YR 6/3, 6/4, or 7.5YR 6/4. It is silt loam or loam with 10 to 30 percent pebbles.

The B2t horizon has dry colors of 10YR 7/4, 7.5YR 7/6, or 5YR 7/6 and moist color of 7.5YR 5/6, 5YR 4/6, or 5/6. It is clay loam with 35 to 65 percent pebbles and is slightly acid to strongly acid.

JORGE SERIES

The Jorge series consists of deep, well drained soils on mountainsides. These soils formed in residuum from volcanic flow rock of andesite, basalt, and latite. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, and Jeffrey pine. Elevation is 6,000 to 9,000 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature 40 to 45 degrees F, and the average frost free season 25 to 75 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Jorge soils are similar to the Sattley and Tallac soils and are associated with the Tahoma soils. Sattley soils have mollic epipedons. Tahoma soils are not skeletal. Tallac soils do not have argillic horizons, are found on glacial outwash and do not have a lithic or paralithic contacts.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Jorge sandy loam in a unit of Jorge-Waca-Tahoma complex, 30 to 50 percent slopes, in the northeast corner of section 8, T. 15 N., R. 16 E.

O1 and O2 3 inches to 0; fresh and decomposed forest litter.

A11 0 to 6 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.7); gradual wavy boundary.

A12 6 to 13 inches; brown(10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.4); clear smooth boundary.

B1 13 to 20 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 30 percent cobbles and 20 percent pebbles; slightly acid (pH 6.2); gradual wavy boundary.

B2lt 20 to 31 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 20 percent cobbles and 20 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 31 to 41 inches; brown (10YR 5/3) very cobbly sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine and fine interstitial pores; 25 percent cobbles and 20 percent pebbles; medium acid (pH 5.8); gradual wavy boundary.

Cl 41 to 47 inches; brown (10YR 5/3) very cobbly sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 30 percent cobbles and 20 percent pebbles; strongly acid (pH 5.4); clear wavy boundary.

Range in characteristics. Thickness of the solum is greater than 40 inches. Cobbles and stones range from 20 to 50 percent throughout the profile.

The A horizon has dry colors of 10YR 4/2, 4/3, or 5/4 and moist colors of 10YR 2/2, 3/4, or 7.5YR 3/2. It is slightly acid or medium acid.

The B2t horizon has dry colors of 10YR 5/3, 5/4, or 6/4 and moist colors of 10YR 3/4 or 7.5YR 4/4. Rock fragments are greater than 35 percent. It is sandy loam or loam and slightly acid or medium acid.

JORGE VARIANT

Jorge Variant soils consist of moderately deep, well drained soils on lake terraces and glacial moraines. These soils farmed in lake sediments and material weathered from glacial deposits. Slope ranges from 2 to 50 percent.

The vegetation is mainly Jeffrey pine and scattered sagebrush. Elevation is 6,500 to 6,400 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost free season is 20 to 40 days.

Permeability is moderate. Available water capacity is low, runoff is medium, and the erosion potential is high.

The Jorge Variant soils are similar to the Boomer Variant, Euer, Euer Variant, Jorge, and Lorack soils and are associated with the Aldi Variant and Kyburz soils. Aldi Variant and Kyburz: soils are not skeletal and Aldi Variant soils have mollic epipedons. Boomer Variant soils have a mesic soil temperature regime. Euer soils are over 40 inches deep. Euer Variant, Jorge, and Lorack soils have ochric epipedons.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Jorge Variant gravelly loam in from a unit of Jorge Variant-Kyburz complex, 2 to 30 percent slopes, near the center of the NE l/4 of section 33, T. 19 N., R. 17 E.

O1 1 inch to 0; fresh and decomposed litter.

A11 0 to 3 inches; dark brown (10YR 3/3) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); gradual smooth boundary.

A12 3 to 11 inches; dark brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few medium roots; common very fine and fine tubular pores, few very fine tubular pores; 20 percent pebbles; slightly acid (pH 6.2); gradual smooth boundary.

B2lt 11 to 23 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine, medium, and coarse roots; common very fine and fine interstitial pores, few very fine tubular pores; very few thin clay films as bridges between mineral grains; 50 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

B22t 23 to 35 inches; brown (7.5YR. 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse roots; common very fine and fine interstitial pores, few fine tubular pores; few thin clay films as bridges between mineral grains and lining pores; 40 percent pebbles; neutral (pH 7.0); diffuse irregular boundary.

Cr 35 inches; highly weathered sediments.

Range in characteristics. Depth to weathered lake sediments is from 20 to 40 inches.

The A horizon has dry color of 10YR 5/3, 4/3, or 3/3 and moist colors of 10YR 3/2, 2/2, or 7.5YR 3/2. It is gravelly sandy loam, gravelly loam, or loam with 10 to 20 percent gravel and is neutral to medium acid.

The B horizon has colors of l0YR 5/4, 7.5YR 5/4, or 4/4. It is gravelly loam, gravelly sandy clay loam, very gravelly sandy clay loam, very gravelly clay loam, or very gravelly loam. Gravel content ranges from 30 to 50 percent.

KINKEL VARIANT

Kinkel Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from pleistocene basalt flows. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer and brush, consisting of white fir, ponderosa pine, Douglas-fir and ceanothus. Elevation is 4,800 to 5,800 feet. The average annual precipitation is about 60 to 70 inches, the average annual air temperature is about 48 to 58 degrees. F, and the average frost-free season is 150 to 200 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Kinkel Variant soils are similar to the Huysink, Jorge, and McCarthy soils and associated with the Cohasset soils. Cohasset soils are not skeletal. Huysink soils have low base saturations. Jorge soils have a frigid soil temperature regime. McCarthy soils do not have an argillic horizon.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Kinkel Variant gravelly sandy loam in a unit of Kinkel Variant-Cohasset complex, 2 to 30 percent slopes near table mountain, in the southeast corner of section 16, T. 19 N., R. 10 E.

O1 and O2 1 inch to 0; fresh and decomposed forest litter.

A11 0 to 7 inches; dark reddish brown (5YR 3/2) gravelly sandy loam, dark reddish brown (5YR 2/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 20 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A12 7 to 14 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 30 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B2t 14 to 26 inches; strong brown (7.5YR 4/6) very gravelly clay loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; 40 percent pebbles and 10 percent cobbles; medium acid (pH 5.7); gradual wavy boundary.

B3t 26 to 43 inches; strong brown (7.5YR 5/6) very gravelly clay loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; 45 percent pebbles and 15 percent cobbles; medium acid (pH 5.7).

C1 43 to 54 inches; strong brown (7.5YR 5/8) very gravelly loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, firm, nonsticky and slightly plastic; few fine and medium roots; 35 percent pebbles and 15 percent cobbles; strongly acid (pH 5.5).

Cr 54 inches; weathered andesitic rock.

Range in characteristics. Solum thickness is greater than 40 inches to weathered volcanic rock.

The A horizon has colors of 10YR 4/4, 4/3, 3/3, 3/2, 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 4/4, 3/4, 3/3, or 3/2, with moist chromas greater than 3.5 in the lower part. It is sandy loam or loam with 0 to 30 percent gravel and 0 to 50 percent cobbles. It is neutral to medium acid.

The B2t horizon has colors of 10YR 5/6, 7.5YR 5/8, 5/6, 5/4, 5/2, 4/6, 4/4, or 4/2. It is loam or clay loam with 15 to 50 percent gravel and 10 to 50 percent cobbles by volume. It is slightly acid or medium acid.

KYBURZ SERIES

The Kyburz Series consists of moderately deep, well drained soils on mountainsides. These soils formed in material weathered from volcanic rock and lake sediments. Slopes range from 2 to 75 percent.

The vegetation is mainly open stands of Jeffrey pine. and ponderosa pine with an understory of sagebrush and bitterbrush. Elevation is 4,800 to 6,400 feet. The average annual precipitation is about 15 to 40 inches, the average annual air temperature is about 40 to 50 degrees F, and the average frost-free season is 20 to 30 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow to rapid, and the erosion potential is high.

The Kyburz soils are similar to the Fugawee, Martis, Sierraville, Tahoma, and Trojan soils and associated with the Sattley, Sierraville, and Trojan soils. Fugawee soils have base saturation of less than 50 percent in the argillic horizon. Sattley, Sierraville, Tahoma, and Trojan soils are more than 40 inches deep. Martis soils do not have a paralithic contact and have umbric epipedons.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Kyburz gravelly sandy loam in a unit of Kyburz-Trojan complex, 9 to 30 percent slopes about 0.4 miles northwest of Woodchoppers Spring, in the SW l/4 SE l/4 of section 13, T. 18 N., R. 16 E.

O1 2 inches to 0; needles, twigs and duff.

Al 0 to 6 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR. 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots and few fine roots; many very fine intersitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

B1t 6 to 12 inches reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; weak fine granular and subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; many very fine interstitial pores; few thin clay films as bridges between mineral grains; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 12 to 23 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very line, fine, and medium roots; many very fine interstitial pores and few very fine tubular pores; many thin clay films lining pores and as bridges between mineral grains; 15 percent pebbles and 5 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

B3t 23 to 34 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine interstitial pores and few fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; 20 percent pebbles; very strongly acid (pH 5.0); abrupt wavy boundary.

Cr 34 inches; fractured weathered andesitic rock, few roots in fractures 5 to 9 in. apart. Range in characteristics. Thickness of the solum is 20 to 40 inches. Rock fragment content ranges from 5 to 35 percent. Base saturation is 50 to 75 percent throughout the argillic horizon.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, 7.5YR. 4/2, 4/4, 5/2, 5/4, 5YR 4/3, 4/4, or 5/3. Moist colors are 10YR 2/2, 3/2, 3/3, 3/4, 7.5YR 3/2, 5YR 3/2, 3/3, or 3/4 with moist chromas of 3 or less above 7 inches. It is sandy loam or loam and is slightly acid or medium acid.

The Bt horizon has dry color of 10YR 6/3, 7/3, 7/4; 7.5YR 4/4, 5/4, 6/4; 5YR 4/4 or 5/4 and has moist color of l0YR 3/3, 3/4, 4/3. 7.5YR 3/3, 3/4, 4/4, 5YR 3/3, 3/4, 4/3, or 4/4. It is loam, clay loam, or sandy clay loam and is slightly acid to very strongly acid.

LEDFORD SERIES

The Ledford series consists of deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer, consisting of red fir and white fir. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 46 to 48 degrees F., and the average frost-free season is 80 to 100 days.

Permeability is rapid. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is high.

The Ledford soils are similar to the Bucking and Celio Variant soils and associated with the Ledford Variant soils. Bucking soils have a mollic epipedon and are sandy. Celio Variant soils are skeletal. Ledford Variant soils are 20 and 40 inches deep.

Taxonomic class. These soils are coarse-loamy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Ledford sandy loam in a unit of Ledford-Ledford Variant complex, 2 to 30 percent slopes, about 4.2 miles northeast of Bassett's; about 1,400 feet west and l,000 feet south of the NE corner of section 4, T. 20 N., R. 13 E.

O1 1 inch to 0; forest litter of fresh and partially decomposed fir needles and branches.

A11 0 to 4 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; common very fine and fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.2); diffuse wavy boundary.

A12 4 to 15 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (l0YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, many fine roots, and few medium roots; common very fine and fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.3); diffuse wavy boundary.

A3 15 to 33 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 20 percent pebbles; medium acid (pH 6.3); clear wavy boundary.

Cl 33 to 41 inches; pale brown (10YR 6/3) very gravelly coarse sandy loam; dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 35 percent pebbles; medium acid (pH 5.9); diffuse irregular boundary.

C2 41 to 56 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 50 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

C3r 58 inches; highly weathered granitic rock.

Range in characteristics. Depth to weathered granitic rock ranges from 40 to 80 inches.

The A horizon has dry colors of 10YR 5/3, 5/4, 4/3, 3/3, 7.5YR 5/2, or 5/4 and moist colors of 10YR 2/2, 3/2, 3/3, 4/3, 4/4, 7.5YR 3/2, or 4/4. It is sandy loam or gravelly sandy loam and slightly acid or medium acid.

The C horizon has colors of 10YR 5/4, 6/3, 7/3, 8/3, 7.5YR 6/4 or 6/6. It is gravelly sandy loam or very gravelly sandy loam.

LEDFORD VARIANT

The Ledford Variant soils consists of moderately deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir and white fir. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 46 to 48 degrees F., and the average frost-free season is 80 to 100 days.

Permeability is rapid. Available water capacity is very low, runoff is slow to rapid, and the erosion potential is high.

The Ledford Variant soils are similar to the Celio Variant soils and associated with the Ledford soils. Celio Variant soils are over 40 inches deep and are skeletal. Ledford soils are over 40 inches deep.

Taxonomic class. These soils are coarse-loamy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Ledford Variant fine sandy loam in a unit of Ledford-Ledford Variant complex, 30 to 50 percent slopes, 0.35 miles north on Lunch Creek Road from Highway 49, in the NE 1/4 NE 1/4 of section 9, T. 20 N., R. 13 E.

O1 1 inch to 0; fresh and partially decomposed fir needles.

A11 0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine and fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

A12 3 to 7 inches; brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine and fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

Cl 7 to 10 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); gradual smooth boundary.

C2 10 to 28 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; common very fine interstitial pores; 20 percent pebbles; medium acid (pH 5.8); abrupt wavy boundary.

C3r 28 inches; weathered granitic rock.

Range in characteristics. Depth to weathered granitic rock ranges from 20 to 40 inches.

The A horizon has dry colors of 10YR 5/2, 4/2, or 7.5YR 5/2 and moist colors of 10YR 3/2, 2/2, or 7.5YR 3/2. It is sandy loam or coarse sandy loam with 10 to 25 percent gravel and is slightly acid to strongly acid.

The C horizon has dry colors of 10YR 6/4, 6/3, or 5/4 and moist colors of 10YR 4/4, 4/3, or 3/4. It is sandy loam or coarse sandy loam with 10 to 25 percent gravel and is medium acid or strongly acid.

LEDMOUNT SERIES

The Ledmount series consists of shallow, well drained soils on tops and sides of flat volcanic ridges. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed brush and hardwood, consisting of manzanita, grasses, and forbs with a few scattered black oak, incense cedar, and ponderosa pine. Elevation is 2000 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 54 degrees F, and the average frost-free season is 180 to 210 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to very rapid, and the erosion potential is high.

The Ledmount soils are similar to the Chawanakee, Deadwood, and Woodseye soils and associated with the Crozier and McCarthy series. Chawanakee soils have granitic parent material and a paralithic contact. Crozier and McCarthy soils are over 20 inches deep, and Crozier soils have aargillic horison. Deadwood soils have metasedimentary parent material and ochric epipedons. Woodseye soils have a frigid soil temperature regime.

Taxonomic class. These soils are medial, mesic Lithic Xerumbepts.

Typical pedon of Ledmount sandy loam in a unit of Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes, in the NE 1/4 NE 1/4 of section 27, T. 17 N., R. 11 E.

O1 Trace; litter and duff.

A11 0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplsatic; many very fine roots; many very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 7 to 18 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine, medium, and coarse roots; many very fine interstitial pores; 10 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R 18 inches; fractured andesitic tuff breccia.

Range in characteristics. Depth to slightly weathered bedrock ranges from 12 to 20 inches. Cobble content ranges from 0 to 20 percent and gravel ranges from 10 to 25 percent.

The A horison has dry colors of 10YR 5/3, 5/2, or 4/2 and moist colors of 10YR 2/1, 2/2, or 3/2. It is sandy loam, gravelly sandy loam, cobbly sandy loam, loam, gravelly loam, or cobbly loam.

In places, a C horizon of weathered andesitic; conglomerate is present.

LEDMOUNT VARIANT

The Ledmount Variant soils consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. These soils are usually found in areas where the rhyolitic tuff has been exposed under a capping of andesitic mudflow of the Merhten Formation. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed brush and scattered conifers, consisting of huckleberry oak, whitethorn, and greenleaf manzanita with Jeffrey pine, whitefir, and red fir. Elevation is 5,500 to 8,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 50 to 70 days.

Permeability is moderately rapid. Available water capapcity is very low to low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Ledmount Variant series are similar to the Ledmount, Meiss, and Woodseye soils and associated with the Ahart, Tinker, and Tallac soils. Ahart soils are greater than 20 inches deep to a paralithic contact. Ledmount and Meiss soils have volcanic parent material, also the Ledmount soils have a mesic soil temperature regime and the Meiss soils are not skeletal. Tinker and Tallac soils have glacial outwash parent material and are greater than 20 inches deep. Woodseye soils are not dominated by vitric pyroclastic material.

Taxonomic class. These soils are medial-skeletal, frigid Lithic Xerumbrepts.

Typical pedon of Ledmount Variant very gravelly sandy loam in a unit of Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes, about 4 miles south of Soda Springs on the Baker Ranch-Soda Springs Road, in the SE l/4 NW l/4 of section 11, T. 16 N., R. 14 E.

O1 1 inch to 0; litter and duff.

A11 0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 30 percent pebbles, 10 percent cobbles; slightly acid (pH 6.3); gradual smooth boundary.

A12 4 to 19 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 40 percent pebbles, 10 percent cobbles; medium acid (pH 6.0); abrupt smooth boundary.

R 19 inches; hard rhyolitic rock.

Range in characteristics. The depth to rhyolitic rock ranges from 11 to 19 inches. Gravel content ranges from 15 to 40 percent and cobbles range from 5 to 15 percent. flase saturation is less than 50 percent throughout the profile.

The A horizon has dry colors of 10YR 4/2, 4/3, 5/2, or 5/3 and moist colors of 10YR 3/1, 3/2, or 3/3, It is fine sandy loam, sandy loam, or loam. Structure is weak to moderate very fine and fine granular. It is slightly acid or medium acid.

Some pedons have C horizons.

LORACK SERIES

The Lorack Series consists of deep and very deep, wall drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash derived from a mixture of parent materials. Slope ranges from 2 to 50 percent.

The vegetation is mainly dense stands of high elevation mixed conifers, consisting of red fir, white fir, and sugar pine. Elevation is 5,500 to 7,000 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 44 to 50 degrees F., the average frost-free season is 100 to 125 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Lorack soils are similar to the Euer, Euer Variant, Horseshoe, Huysink, and Martis soils and associated with the Smokey soils. Euer and Martis soils have umbric epipedons. Euer Variant soils are not skeletal. Horseshoe and Huysink soils have a mesic soil temperature regime. Smokey Variant soils do not have an argillic horizon and are less than 40 inches deep.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Lorack very gravelly fine sandy loam in a unit of Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes approximately 0.4 miles NE along Carr Lake Road from Bowman Road intersection, near the NW corner of SE 1/4 SE 1/4 of section 30, T. 18 N., R. 12 E.

O1 1 inch to 0; fresh and decomposed needles and leaves.

Al 0 to 3 inches; dark brown (7.5YR 3/4) very gravelly fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and fine interstitial pores; 30 percent pebbles, 10 percent cobbles. 10 percent stones; medium acid (pH 6.0); abrupt smooth boundary.

A3 3 to 8 inches; strong brown (7.5YR 5/6) very gravelly fine sandy loam, dark- reddish brown (5YR 3/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, line, and medium roots, common coarse roots; many very fine and fine interstitial pores, few very fine tubular pores; 30 percent pebbles, 10 percent cobbles, 10 percent stones; slightly acid (pH 6.3); clear wavy boundary.

Bl 8 to 19 inches; strong brown (7.5YR 5/6) very gravelly loam, strong brown (7.5YR 4/6) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots, common coarse roots; many very fine and fine interstitial pores, common very fine and fine tubular pores; 30 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear wavy boundary.

B2lt 19 to 32 inches; yellowish brown (10YR 5/8) very gravelly loam, strong brown (7.5YR 5/6) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores, common fine tubular pores; few thin clay films as bridges between mineral grains; 30 percent pebbles, 10 percent cobbles, 10 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B22t 32 to 45 inches; yellowish brown (10YR 5/8) extremely gravelly loam, strong brown (7.5YR 5/8) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; many very fine and fine interstitial pores, common very fine and fine tubular pores; few thin clay films lining pores, root channels, and as bridges between mineral grains; 45 percent pebbles, 10 percent cobbles, 10 percent stones; strongly acid (pH 5.5); clear irregular boundary.

B3t 45 to 56 inches; reddish yellow (7.5YR 6/8) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate line and medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common fine and medium roots; many very fine and fine interstitial pores, few fine tubular pores: common thin clay films and few moderately thick clay films lining pores, root channels, and on face of peds; 20 percent pebbles, 10 percent cobbles, 10 percent stones; very strongly acid (pH 5.0); abrupt wavy boundary.

Csi 56 to 75 inches; yellow (10YR 7/6) intermittently cemented extremely gravelly sandy loam, strong brown (7.5YR 5/8) moist, common fine distinct strong brown (7.5YR 4/6) mottles, moist; massive; very hard, very firm, nonsticky and nonplastic; common fine and medium roots in cracks 6 to

12 inches apart; few thin clay films lining root channels and very few thin clay films as bridges between mineral grains; 70 percent pebbles, 10 percent cobbles, 10 percent stones; extremely acid (pH 4.3).

Range in characteristics. The solum is 45 to 70 inches thick. Base saturation in the lower B2t or B3t horizons is between 15 and 33 percent.

The Al horizon has dry colors of 7.5YR 3/4, 4/4, 5YR 4/4, or 5/6 and moist colors of 7.5YR 3/2, 3/4, 5YR 3/4, or 4/6. It is gravelly fine sandy loam, very gravelly fine sandy loam, very gravelly loam, or gravelly loam and has 15 to 45 percent gravel. The Al horizon is medium acid or slightly acid.

The B2t horizon has dry colors of 7.5YR 5/6, 6/6, 6/8, 10YR 5/8, or 6/6 and moist colors of 7.5YR 4/6, 5/6, 5/8, 6/6, 5YR 5/6, or 5/8. It is gravelly or very gravelly loam, clay loam, or silty clay loam, and has 15 to 50 percent gravel and 5 to 25 percent cobbles. The B2t horizon is very strongly acid to medium acid.

Some pedons have a C horizon of very gravelly sandy loam texture between the B2t horizon and the compacted glacial till. The glacial till is intermittently cemerited.

LORACK VARIANT

The Lorack Variant soils consist of moderately deep, moderately well drained soils on mountainsides. These soils formed in glacial outwash and material from volcanic sources. Slope ranges from 2 to 30 percent.

The vegetation is mainly mixed conifers, consisting of white fir and sugar pine with an understory of manzanita, bitterbrush, and squaw carpet. Elevation is 5,500 to 6,500 feet. The average annual precipitaton is about 30 to 45 inches. The average annual air temperature is about 42 to 45 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderately slow. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Lorack Variant soils are similar to the Boomer Variant, Euer, Jorge, Lorack, and Sattley soils, and associated with the Tallac and Waca soils. Boomer Variant soils have a mesic soil temperature regime. Euer soils have umbric epipedons. Jorge and Lorack soils have sola over 40 inches thick and Jorge soils are formed on volcanic parent material. Sattley soils have mollic epipedons. Tallac and Waca soils do not have argillic horizons, and Waca is less than 40 inches deep to a paralithic contact.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Lorack Variant gravelly loam in a unit of Lorack Variant gravelly loam, 2 to 30 percent slopes, in the NE 1/4 NW 1/4 of section 28, T. 17 N., R. 16 E.

O 2 inches to 0; mixed conifer needles and decomposed litter.

Al 0 to 7 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine granular structure: soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots, few medium and coarse roots; 25 percent pebbles; neutral (pH 7.0); clear smooth boundary.

B1t 7 to 15 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots, common fine roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; 5 percent cobbles, 30 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 15 to 25 inches; dark brown (7.5YR 3/2) very gravelly clay loam, brown (7.5YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; 10 percent cobbles, 25 percent pebbles; neutral (pH 7.0); clear wavy boundary.

Cl 25 to 36 inches; brown (7.5YR 5/4) extremely gravelly sandy loam, darkbrown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; few very fine and fine tubular pores; few thin clay films lining pores and as bridges between mineral grains; 10 percent cobbles, 65 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

C2si 36 to 70 inches; weakly cemented till; few coarse roots.

Range in characteristics. Depth to weakly cemented till is 30 to 40 inches.

The Al horizon has dry colors of 10YR 5/3, 4/3, 7.5YR 5/4, 5/2, 4/4, or 4/2 and moist colors are 7.5YR 4/4, 4/2, 3/4, or 3/2. Textures are gravelly loam or very gravelly fine sandy loam. It is medium acid to neutral.

The B2t horizon has dry colors of 10YR 6/4 or 7.5YR 3/2 and moist colors of 10YR 4/3 or 7.5YR 4/4. It is gravelly clay loam or very gravelly sandy clay loam. The B2t is massive or has weak or medium coarse subangular blocky structure and is slightly acid or neutral.

MARIPOSA SERIES

The Mariposa series consists of shallow and moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense to dense stands of mixed conifers, hardwoods, and brush consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, black oak, canyon live oak, or manzanita. Elevation is 1,800 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 62 degrees F, and the average frost free season is 125 to 225 days.

Permeability is moderate. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Mariposa soils are similar to the Crozier and Smokey soils and associated with the Deadwood, Jocal, and Hurlbut Soils. Crozier soils are formed on volcanic rock and do not have interrupted B horizons. Deadwood soils are less than 20 inches deep to a lithic contact and are skeletal. Hurlbut soils do not have argillic horizons. Jocal soils are over 40 inches deep to a paralithic contact. Smokey soils have a frigid soil temperature regimes and are skeletal.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ruptic-Lithic-Xerochreptic Haploxerults.

Typical pedon of Mariposa gravelly loam in a unit of Mariposa-Jocal complex, 30 to 75 percent slopes, approximately 6 miles north of Foresthill 30 feet above the Sugar Pine pipeline at station 111+00 in the NE1/4 NWl/4 of section 36, T. 15 N., R. 10 E.

O1 and O2 2 inches to 0; oak leaves, pine needles, fir needles, partially decomposed litter and duff.

A11 0 to 4 inches; dark brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist strong very fine and fine granular structure: soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine, fine, and medium interstitial pores; 15 percent pebbles; neutral (pH 7.0); abrupt smooth boundary.

A12 4 to 6 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine roots and few medium roots; common very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 6.7); clear wavy boundary.

B1t 6 to 15 inches; strong brown (7.5YR 4/6) gravelly loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common very fine and fine interstitial pores and few medium tubular pores; common thin clay films lining pores and on faces of peds; 20 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2lt 15 to 20 inches; yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; common fine and medium interstitial and tubular pores; common thin clay films lining pores and on faces of peds; 25 percent pebbles; medium acid (pH 6.0); gradual irregular boundary.

B22t 20 to 33 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common fine and medium tubular pores; common thin clay films lining pores; 30 percent pebbles; strongly acid (pH 5.5); gradual irregular boundary.

R 33 inches; fractured hard and semi-hard metasediments. Fractures are 1 to 3 inches apart. Some soil material in some fractures. Rock fragments have not been displaced.

Range in characteristics. Depth to slightly weathered slate and shale is more than 20 inches when the B2t horizon is present. Some pedons do not have a B2t horizon and are less than 20 inches deep. Gravel ranges from about it to 35 percent. Soil color commonly is influenced by the underlying rock.

The A horizon has colors of 10YR 5/8, 5/6, 5/4, 5/3, 4/3, 3/3, 7.5YR 5/8, 5/6, 5/4, 5/2, 4/6, 4/4, 4/2, 3/4, or 3/2. It is loam or gravelly loam and is slightly acid or medium acid. It has granular or blocky structure.

The B2t horizon has colors of 10YR 5/3, 4/3, 7.5YR 7/8, 7/6, 6/8, 6/6, 5/4, 5/2, or 4/4. It is clay loam or gravelly clay loam, is medium acid to very strongly acid, and has granular or blocky structure. This horizon is interrupted by ledges of bedrock.

An AC horizon is present in some pedons with colors of 7.5YR 8/2, 7/8, or 6/6. It is strongly acid or very strongly acid and gravelly or very gravelly loam or very gravelly clay loam. In some pedons, however, the C horizon is nongravelly. This horizon is massive.

MARTINECK SERIES

The Martineck series consists of shallow, well drained soils on old terraces. These soils formed in residuum weathered from cobbly and stony alluvium. The alluvium is consisting of derived from basic igneous rock and is underlain by indurated to consolidated lake sediments. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush, grass, and scattered conifers; consisting of low sagebrush, cheatgrass, juniper, and Jeffrey pine on the higher terraces. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches. The average annual air temperature is about 40 to 42 degrees F. and the average frost free season is 50 to 60 days.

Permeability is very slow. Available water capacity is very low, runoff is slow to medium, and the erosion potential is high.

The Martineck soils are similar to the Aldi Variant soils and are associated with the Badenaugh and Dotta soils. These soils do not have duripans. In addition, Aldi Variant and Dotta soils are not skeletal. Aldi Variant soils have a frigid soil temperature regime.

Taxonomic class. These soils are clayey-skeletal, montmorillonitic, mesic, shallow Aridic Durixerolls.

Typical pedon of Martineck extremely stony sandy loam in an area of Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, approximately 2 1/4 miles southeast of Loyalton, 1,320 feet south and 300 feet west of the N1/4 corner of section 29, T. 21 N., R. 18 E.

A11 0 to 2 inches; grayish brown (10YR 5/2) extremely stony sandy loam, very dark brown (10YR 2/2) moist; weak thick platy structure; loose, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores, common vesicular pores; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

A12 2 to 6 inches; gray (10YR 5/1) extremely stony sandy loam, very dark brown (10YR 2/2) moist; weak thick platy structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B1t 6 to 12 inches; dark grayish brown (10YR 4/2) extremely stony sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; many very fine and fine roots, common medium roots; common very fine and fine tubular and interstitial pores; common thin clay films lining pores and as bridges between mineral grains; 60 percent stones and 20 percent cobbles; slightly acid (pH 6.2); abrupt wavy boundary.

B2t 12 to 19 inches; brown (10YR 4/3) extremely stony sandy clay, with yellowish brown (10YR 5/6) stains, dark brown (10YR 3/3) moist, with lighter and darker mineral colors; strong medium prismatic structure; extemely hard, extremely firm, sticky and very plastic; few fine and very fine tubular pores; continuous moderately thick clay films lining pores and on faces of peds; some nearly black manganese stains on faces of peds; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

IIClsim 19 to 24 inches; pale yellow (2.5Y 7/4) indurated duripan with dark gray (10YR 4/1) stains on fracture planes, dark yellowish brown (10YR 4/4) moist; massive; extremely hard, extremely firm; medium acid (pH 5.8).

IIC2 24 to 60 inches; stratified lake sediments becoming less consolidated and less indurated with depth.

Range in characteristics. Depth to a strongly cemented or indurated horizon is 10 to 20 inches. The soil profile above the duripan contains 40 to 80 percent rock fragments, mostly cobbles and stones.

The A horizon has dry color of 10YR 4/1, 4/2, 5/1, or 5/2 and moist color of l0YR 2/1, 2/2, 3/1, or 3/2. It is coarse sandy loam, sandy loam, or loam.

The B2t horizon has dry color of 10YR 3/3, 4/3, or 5/3. It is sandy clay loam, sandy clay, or clay.

The IICsim horizon has silica coatings resembling lime but is not effervescent. This horizon does not have the rock fragments of the overlying solum.

MARTIS SERIES

The Martis series consists of deep and very deep, Well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly sagebrush and bitterbrush. Elevation is 5,500 to 6,000 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 40 to 45 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is slow to medium, and the erosion potential is moderate.

The Martis soils are similar to the Jorge, Sattley, Tallac, and Zeibright soils and associated with the Euer, Kyburz, and Trojan soils. Euer soils are skeletal. Jorge and Sattley soils have volcanic parent material and are skeletal. Kyburz soils are less than 40 inches deep to a paralithic contact and Trojan soils have mollic epipedons. Tallac and Zeibright soil do not have argillic horizons and Zeibright soils have a mesic soil temperature regime.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Martis sandy loam in a unit of Martis-Euer Variant complex, 2 to 5 percent slopes, about 4 miles northeast of Truckee, 1,000 feet southwest of the south end of Prosser Dam near the center of the SW1/4 SE1/4 section 25, T. 18 N., R. 16 E.

A11 0 to 7 inches; dark brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few fine roots, common very fine roots; many very fine interstitial pores; 10 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

A12 7 to 17 inches; brown (l0YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; few very fine and medium roots; many very fine interstitial pores; 5 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B2lt 17 to 23 inches; brown (l0YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and slightly plastic; few fine roots; few very fine interstitial and discontinuous tubular pores; few thin clay films as bridges between mineral grains and lining pores, very few moderately thick clay films as bridges between mineral grains; 5 percent stones, 5 percent cobbles, 20 percent pebbles; strongly acid (pH 5.5); abrupt wavy boundary.

B22t 23 to 33 inches; brown (l0YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; massive; hard, firm, sticky and slightly plastic; few fine roots; few very fine vesicular and discontinuous tubular pores; very few moderately thick clay films lining pores and as bridges between mineral grains, common thin clay films as bridges between mineral grains; 7 percent cobbles, 15 percent pebbles; medium acid (6.0); clear wavy boundary.

B3lt 33 to 46 inches; brown (l0YR 5/3) gravelly sandy clay loam, dark yellowish brown (l0YR 3/4) moist; massive; hard, firm, sticky and plastic; few and medium fine roots; few very fine tubular pores; few thin and moderately thick clay films as bridges between mineral grains; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B32t 46 to 67 inches; brown (10YR 5/3) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few discontinuous tubular pores; few thin and moderately thick clay ifims lining pores and as bridges between mincral grains; 10 percent pebbles; medium acid (pH 6.0).

Range in characteristics. Thickness of the solum ranges from 40 to 70 inches. The umbric epipedon is 10 to 20 inches thick and in some pedons includes the upper B horizon. Base saturation is 35 to 50 percent in some portions of the argillic horizon.

The A horizon has dry colors of l0YR 3/2, 4/2, 4/3, or 5/3 and moist colors of 10YR 3/1, 3/2, 3/3, or 7.5YR 3/2. It is sandy loam or loam with 5 to 20 percent gravel. This horizon has granular, subangular blocky, or thick platy structure. It is slightly acid to strongly acid.

The upper part of the Bt horizon has dry colors of 10YR 5/2, 5/3, 5/4, 6/3, 6/4, or 7.5YR 5/4, and moist colors of 10YR 3/3, 3/4, 4/4, 7.5YR 3/2, or 4/4. It is sandy clay loam or sandy loam with 15 to 30 percent gravel and 3 to 5 percent cobbles. This horizon has subangular blocky structure or is massive and has high bulk density. It is medium acid to strongly acid.

The lower part of the Bt horizon has dry colors of 10YR 5/3, 6/3, 6/4, 7.5YR 4/4, or 5/4 and moist colors of 10YR 3/4, 4/3, 4/4, 5/6, or 7.5YR 3/2. It is sandy clay loam or sandy loam and has 3 to 20 percent cobbles and 10 to 80 percent gravel. Rock fragments increase with increasing depth and exceed 35 percent below 32 inches in some pedons.

MARTIS VARIANT

Martis Variant soils consist of deep, well drained soils on outwash terraces. These soils formed in deposits of Donner glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush, consisting of sagebrush and bitterbrush. Elevation is 5,000 to 6,500 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost free season is 20 to 40 days.

Permeability is slow through the dense horizon and rapid both above and below this horizon. Available water capacity is very low to low, runoff is slow, and the erosion potential is high.

The Martis Variant soil is similar to the Jorge, Sattley, Tallac, and Zeibright soils and associated with the Euer and Martis soils. Euer soils do not have a layer of high bulk density. Martis soils are non-skeletal. Jorge soils have ochric epipedons. Sattley soils have mollic epipedons. Tallac soils have a weakly cemented layer below 40 inches. Ziebright soils have a mesic soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Martis Variant in a unit of Euer-Martis Variant complex, 5 to 30 percent slopes near the center of NW 1/4 NE 1/4 section 23, T. 18 N., R 16 E.

Al 0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium and coarse granular structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; common very fine vesicular and interstitial pores; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

A3 5 to 10 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very iriable, nonsticky and slightly plastic; many very fine and fine roots, few medium roots; common very fine vesicular and interstitial pores; 15 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

B21t 10 to 15 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; many fine vesicular and interstitial pores; few thin clay films on faces of peds and lining pores; 40 percent pebbles; neutral (pH 6.6); abrupt wavy boundary.

B22t 15 to 26 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine vesicular and interstitial pores; common thin clay films lining pores and as bridges between mineral grains; 70 percent pebbles; neutral (pH 6.8); clear irregular boundary.

B3 26 to 51 inches; brownish yellow (10YR 6/6) extremely gravelly sandy loam, brownish yellow (10YR 6/6) moist; massive; very hard, friable, slightly sticky and plastic; very few very fine roots; very few very fine vesicular and interstitial pores; very few thin clay films lining pores; 70 percent pebbles; neutral (pH 6.8).

Range in characteristics. The effective rooting depth is 18 to 26 inches because of a horizon of high bulk density in the lower B horizon.

The A horizon has dry colors of 10YR 4/2 or 4/3 and moist colors of 10YR 2/2 or 3/2. It is sandy loam or loam with 15 to 30 percent pebbles. It is slightly acid to medium acid.

The B horizon has dry colors of 10YR 5/3 or 6/6 and moist colors of 7.5YR 3/2, 10YR 5/6, or 6/6. It is sandy clay loam in the B2t horizon and sandy loam in the B3 horizon. Rock fragment ranges from 40 to 90 percent. it is neutral or slightly acid.

McCARTHY SERIES

The McCarthy series consists of moderately deep, well drained soils on tops and sides of flat volcanic ridges. These soils formed in residuum weathered from andesitic mudflows (Mehrten Formation). Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of white fir, ponderosa pine, and black oak with an understory of manzanita and mountain whitethorn. Elevation is 2,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 58 degrees F., and the average frost-free season is 130 to 200 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The McCarthy soils are similar to the Ahart, Tinker, and Waca soils and associated with the Cohasset, Crozier, Putt, and Zeibright soils. Ahart and Waca soils have a frigid soil temperature regime. Crozier and Cohasset soils have argillic horizons and are not skeletal. Putt and Tinker soils have a silica cemented duripan in the profile between 20 and 40 inches, and Tinker soils have a frigid soil temperature regime. Zeibright soils are formed on glacial outwash and are greater than 40 inches deep.

Taxonomic class. These soils are medial-skeletal, mesic Andic Xerumbrepts.

Typical pedon of McCarthy gravelly sandy loam in a unit of McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes about 18 miles northeast of Foresthill, 100 feet west of the American Hill Road, in the NE 1/4 NW 1/4 of section 11, T. 15 N., R. 12 E.

O1 and O2 2 inches to 0; litter and duff.

A11 0 to 9 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.7); gradual smooth boundary.

A12 9 to 15 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, firm, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; few thin colloids stain mineral grains; 18 percent pebbles; slightly acid (pH 6.7); clear wavy boundary.

B2t 15 to 28 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many fine and medium roots; common very fine and fine interstitial pores; few thin clay films lining pores and few thin colloids stain mineral grains; 40 percent pebbles; slightly acid (pH 6.7); abrupt wavy boundary.

Cr 28 inches, weathered andesitic tuff breccia.

Range in characteristics. Depth to weathered rock ranges from 20 to 40 inches. Gravel and cobbles range from 15 to 60 percent. Base saturation throughout the soil is betwen 20 and 50 percent.

The A horizon has dry colors of 10YR 5/2, 4/2, 4/3, 3/3, 7.5YR 5/4, 5/3, 4/4, 4/3, 4/2, 3/4, or 3/2 and moist colors of 10YR 3/2, 7.5YR 3/2, or 3/3. It ls sandy loam or loam and slightly acid or medium acid.

The B horizon has dry colors of 7.5YR 6/6, 5/4, 5/6, 4/4, 4/6, 5YR 4/4, 5/6, or 4/6 and moist colors of 7.5YR 4/4 or 5 YR 3/3. It is sandy loam or loam and is slightly acid or medium acid.

MEISS SERIES

The Meiss series consist of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from andesitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly grasses, forbs, and scattered conifers, consisting of squirreltail, wyethia, and red fir. Elevation is 6,000 to 10,000 feet. The average annual precipitation is about 50 to 80 inches, the average annual air temperature is 36 to 48 degrees F., and the average frost free season is 25 to 125 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid to very rapid, and the erosion potential is high.

The Meiss soils are similar to the Ledmount, Woodseye, and Ledmount Variant soils and associated with the Waca soils. Ledmount soils have a mesic soil temperature regime and a mollic epipedon. Waca soils are 20 and 40 inches deep. Woodseye soils are not dominated by vitric pyroclastic material and have metasedimentary parent material. Ledmount Variant soils are skeletal and are formed on rhyolithic tuff.

Taxonomic class. These soils are medial Lithic Cryumbrepts.

Typical pedon of Meiss sandy loam in a unit of Meiss-Rock outcrop complex, 2 to 30 percent slopes, in the NW 1/4 NE 1/4 of section 12, T. 17 N., R. 13 E.

O1 1 inch to 0; scattered litter and duff,

A11 0 to 9 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; neutral (pH 7.0); clear wavy boundary.

A12 9 to 19 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky parting to very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 10 percent pebbles; neutral (pH 7.0); abrupt wavy boundary.

R 19 inches; hard volcanic rock.

Range in characteristics. Depth to bedrock ranges from 12 to 20 inches. These soils are dominated by vitric material. Rock fragments range from 5 to 35 percent throughout the profile.

The A horizon has colors of 10YR 5/4, 5/3, 4/3, 4/2; 7.5YR 5/4, 5/2, 4/4, or 4/2. Moist chromas are 3 or less to a depth of 7 inches or more. Texture is loam, sandy loam, or coarse sandy loam and it is neutral to medium to acid.

MUSICK SERIES

The Musick series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed confier and hardwoods, consisting of Douglas-fir, ponderosa pine, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 54 to 59 degrees F., sand the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium to rapid, and the erosion potential is high to very high.

The Musick soils are similar to the Aiken, Boomer, Cohasset, Jocal, and Sites soils and associated with the Hoda, Holland, and Hotaw soils. Aiken and Sites soils have a base saturation of less than 35 percent in the argillic horizon and are clayey. Boomer and Cohasset soils have less than 16 percent coarse and very coarse sand in the argillic horizon. Cohasset, Holland, and Jocal soils do not have a hue as red as 2.5YR in the argillic horizon. Hoda soils have a fine particle-size class. Hotaw soils are less than 40 inches deep.

Taxonomic class. These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Musick loam in a unit of Hoda-Musick complex, 2 to 30 percent slopes, about 4 miles southwest of Camptonville in the center of the SW 1/4 SW 1/4 of section 17, T. 18 N., R. 8 E.

O1 2 inches to 0; litter and duff.

A11 0 to 3 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few very fine interstitial pores; slightly and (pH 6.3); clear wavy boundary.

A12 3 to 8 inches brown (7.5YR 5/4) loam, yellowish red (5YR 4/6) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine and medium roots, few coarse roots; common fine interstitial pores, few medium and coarse tubular pores; few thin clay films on faces of peds; slightly acid (pH 6.3); abrupt smooth boundary.

B2lt 8 to 16 inches; reddish brown (2.5YR 4/4) clay loam, dark red (2.5YR 3/6) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and very plastic; few fine and medium roots; few fine interstitial pores; continuous thick clay films on faces of peds and lining pores; slightly acid (pH 6.3); clear irregular boundary.

B22t 16 to 35 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; massive; slightly hard, firm, sticky and plastic; few very fine and fine roots; few very fine interstitial pores; many moderately thick clay films lining pores; medium acid (pH 6.0); gradual irregular boundary.

B3t 35 to 80 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/8) moist; massive; slightly hard, firm, sticky and plastic; few fine, medium, and coarse roots; many very fine interstitial pores; common moderately thick clay films as bridges between mineral grains; medium acid (pH 6.0); diffuse wavy boundary.

Range in characteristics. Depth to weathered granitic rock is from 60 to 80 inches.

The A horizon has dry colors of 10YR 5/3, 5/2, 4/3, 4/2, 7.5YR 5/4, 5/2, 4/4, or 4/2 and moist colors of 10YR 4/4, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/6, 4/4, 4/3, 3/4, 3/3, or 3/2. It is coarse sandy loam, fine sandy loam, sandy loam, or loam. It is slightly acid or medium acid.

The B2t horizon has colors of 5YR 5/8, 5/6, 5/4, 4/8, 4/6, 4/4, 2.5YR 5/8, 5/6, 4/8, 4/6, or 3/6. It is clay loam or sandy clay loam and slightly acid to strongly acid.

NEER SERIES

Neer soils are moderately deep, well drained soils on mountainsides. These soils formed in residuum weath. ered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer, consisting of ponderosa pine, sugar pine, incense cedar, and black oak and an understory story of manzanita. Elevation is 3,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 52 degrees F, and the average frost-free season is 125 to 200 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is moderate to high.

The Neer soils are similar to the Portola and Waca soils and associated with the Ponto Variant and McCarthy soils. McCarthy soils have umbric epipedons and andesitic mudfiow parent material. Ponto Variant soils are non-skeletal. Portola and Waca soils have a frigid soil temperature regime.

Taxonomic class. These soils are medial-skeletal, mesic Andic Xerochrepts.

Typical pedon of Neer extremely gravelly sandy loam in a unit of Ponto Variant-Neer complex, 2 to 30 percent slopes, at Sugar Pine Point in section 17, T. 16 N., R. 13 E.

O1 3 inches to 0; litter and duff.

Al 0 to 6 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 75 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

B21 6 to 16 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 80 percent pebbles; medium acid (pH 6.0); clear irregular boundary.

B22 16 to 29 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; common very fine interstitial pores; 80 percent pebbles; medium acid (pH 6.0); abrupt wavy boundary.

Cr 29 inches; weathered rhyolithic tuff.

Range in characteristics. Thickness of the solum ranges from 20 to 40 inches. Gravel content ranges from 50 to 80 percent.

The A horizon has colors of 10YR 6/3, 6/2, or 5/2. It is sandy loam or loam and slightly acid or medium acid.

The B horizon has colors of 10YR 8/4, 8/3, 7/4, 7/3, 7/2, 7/1, 6/2, or 6/1. It is sandy loam or loam and medium acid to very strongly acid.

The Neer soils in this survey area are a taxajunct to the Neer series because of the 10YR 6/3 colors in the A horizon. This difference, however, does not significantly affect use and management.

PONTO VARIANT

Ponto Variant soils are moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and brush, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, and manzanita. Elevation is 3,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 56 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Ponto Variant soils are similar to the Portola and Waca soils and associated with the Neer soils. Portola and Waca soils have a frigid soil temperature regime. Neer soils are skeletal.

Taxonomic class. These soils are medial, mesic Andic Xerochrepts.

Typical pedon of Ponto Variant sandy loam in a unit of Ponto Variant-Neer complex, 30 to 50 percent slopes, near McGuire Mtn. in the NE 1/4 NW 1/4 of sec. 18, T. 16 N., R. 11 E.

O1 4 inches to 0; decomposed pine and fir needles.

Al 0 to 7 inches; gray (10YR 5/1) sandy loam, dark gray (l0YR 4/1) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; many fine and medium interstitial pores; neutral (pH 6.8); gradual smooth boundary.

B21 7 to 13 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium angular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; many fine and medium interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

B22 13 to 22 inches; gray (10YR 6/1) fine sandy loam, dark gray (10YR 4/1) moist; moderate fine and medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots, few medium and coarse roots; common fine interstitial pores; slightly acid (pH 6.3); abrupt wavy boundary.

Cr 22 inches; highly weathered rhyolitic tuff.

Range in characteristics. Depth to weathered rhyolitic tuff ranges from 20 to 40 inches. Gravel content ranges from 0 to 35 percent throughout the profile.

The A horizon has colors of 10YR 6/3, 6/2, 5/2, or 5/1. It is loamy sand to loam and neutral to medium acid.

The B horizon has colors of 10YR 8/4, 8/3, 7/4, 7/3, 7/2, 7/1, 6/2, or 6/1. It is sandy loam, fine sandy loam, or loam and slightly acid to very strongly acid.

PORTOLA SERIES

The Portola series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of white fir and Jeffrey pine. Elevation is 5,000 to 6,000 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is about 40 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Portola soils are similar to the Ahart, Ponto Variant, and Waca soils and are associated with the Kyburz and Trojan soils. Ahart and Waca soils have umbric epipedons. Kyburz and Trojan soils have argillic horizons. Ponto Variant soils have a mesic soil temperature regime.

Taxonomic class. These soils are medial, frigid Andic Xerochrepts.

Typical pedon of Portola gravelly fine sandy loam in a unit of Portola gravelly fine sandy loam, 30 to 50 slopes, approximately 7 miles southwest of Loyalton, 3 miles south on Alder Creek Road off of Smithneck Road, 100 feet south of road in cutbank on landing site, in the NW 1/4 NW 1/4 of section 23, T. 20 N., R 16 E.

O1 2 inches to 0 ; decomposed and partially decomposed fir and pine needles.

Al 0 to 3 inches; brown (10YR 5/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular strucuture; soft, very friable, nonsticky and slightly plastic; common very fine fine, and medium roots; many very fine interstitial pores; 30 percent pebbles; strongly acid (pH 3.5); abrupt smooth boundary.

B1 3 to 10 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, friable, nonsticky and slightly plastic; many very fine roots, common medium and coarse roots; many very fine, common fine, and few medium interstitial pores; 30 percent pebbles; slightly acid (pH 6.3); clear wavy boundary (5 to 9 inches thick).

B21-10 to 21 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine roots, common medium roots, few coarse roots; many very fine interstitial pores; 30 percent pebbles, 3 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B22 21 to 31 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and medium roots; many very fine interstitial pores; 20 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear wavy boundary.

B3 31 to 39 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nouplastic; common very fine and fine roots, few medium and coarse roots; 25 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear irregular boundary.

Cr 39 inches; weathered rhyolite with fractures greater than 5 inches apart; few roots in fractures.

Range in characteristics. Soil depth ranges from 20 to 40 inches. Rock fragment content ranges from 5 to 35 percent.

The A horizon has colors of 10YR 6/3, 6/2, 5/2, or 4/2. It is loamy sand, sandy loam, or loam and slightly acid or medium acid.

The B horizon has colors of 10YR 8/3, 7/4, 7/3, 6/3, or 6/2. It is fine sandy loam or sandy loam. It has weak or moderate subangular blocky structure and is slightly acid to strongly acid.

PUTT SERIES

The Putt series consists of moderately deep, well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in residuum weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, white fir, incense cedar, and black oak with an understory of manzanita and mountain whitethorn. Elevation is 3,500 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F., and the average frost-free season is 100 to 150 days.

Permeability is moderately rapid above the cemented pan, and very slow within the pan. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Putt soils are similar to the Tallac, Tinker, and Woodseye soils and are associated with the Deadwood, Hurlbut, McCarthy, and Zeibright soils. Deadwood and Woodseye soils are less than 20 inches deep to a lithic contact and Woodseye soils have a frigid soil temperature regime. Huribut soils have ochric epipedons. McCarthy soils are influenced by pyroclastic materials. Tallac and Zeibright soils are over 40 inches deep and the Tallac soils have a frigid soil temperature regime. Tinker soils have a frigid soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Andic Xerumbrepts.

Typical pedon of Putt very cobbly sandy loam in a unit of Putt-Zeibright complex, 2 to 30 percent slopes, 5 miles south of Emigrant Gap; 2.8 miles along the road from Sailor Point to Carpenter Flat, 33 feet east of the road; 7, T. 16 N., R 12 E.

O1 2 inches to 0; fresh and decomposed needles and leaves.

A11 0 to 6 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 10 percent pebbles, 30 percent cobbles, 5 percent stones; sllghtly acid (pH 6.5); clear smooth boundary.

A12 6 to 7 inches; dark brown (10YR 4/3) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 20 percent pebbles, 30 percent cobbles, 5 percent stones; slightly acid (pH 6.5); gradual smooth boundary.

A13 7 to 20 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 40 percent pebbles, 30 percent cobbles, 5 percent stones; medium acid (pH 6.0); abrupt smooth boundary.

C1si 20 to 35 inches; pale yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/8) moist; strong thick platy structure; very hard, friable, nonsticky and nonplastic; common coarse roots, becoming horizontal on horizon surface; few very fine and fine tubular horizontal pores; continuous opalized coatings on the upper surface of the horizon; 30 percent cobbles, 5 percent stones; medium acid (pH 5.7); clear wavy boundary.

C2 35 to 47 inches; pals yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/6) moist; strong thick platy structure; hard, very friable, nonsticky and slightly plastic; few fine roots in fractures greater than 4 to 6 inches apart; common very fine and fine tubular pores, few very fine interstitial pores; few thin clay films as bridges between nuneral grains; 30 percent cobbles, 5 percent stones; strongly acid (pH 5.7); abrupt wavy boundary.

C3si 47 to 55 inches; pale yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/4) moist: massive; very hard, friable, nonsticky and nonplastic; few fine roots in fractures 4 to 6 inches apart; common very fine and fine horizontal tubular pores; 30 percent cobbles, 5 percent stones; very strongly acid (pH 5.0).

Range in characteristics. The depth to the silica cemented C2si horizon is from 20 to 34 inches. The base saturation is less than 50 percent throughout the profile. Thickness of the umbric epipedon ranges from 20 to 29 inches. Cobble and stone content ranges from 15 to 60 percent throughout the profile.

The Al horizon has colors of 10YR 3/2, 3/3, 4/2, 4/3,

5/3, 3/4, or 7.5YR 3/2. It is fine sandy loam, sandy loam, or loam.

The C horizon has dry colors of 10YR 4/3, 5/6, 5/4, 7/4, 8/1, 2.5Y 7/4, or 8/2 and moist colors of 10YR 3/4, 4/1, 4/3, 4/4, 5/4, 5/6, 5/8, 2.5Y 6/2, or 7/6. It is sandy loam, fine sandy loam, loam, or sand. The Csi horizon has dry colors of 10YR 7/1, 6/1, 5/4, or 2.5Y 7/4 and moist colors of 10YR 3/4, 5/1, or 5/4.

ROUEN VARIANT

The Rouen Variant soils are deep, well drained soils on mountainsides. These soils formed in residuum weathered from metavolcanic rocks. Slope ranges from 2 to 50 percent.

The vegetation is mainly brush, consisting of ceanothus. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 20 to 25 inches. The average annual air temperature is about 36 to 42 degrees F., and the average frost-free season is less than 25 days.

Permeability is moderate. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is moderate to high.

The Rouen Variant soils are similar to the Umpa soils and are assoicated with the Aspen Variant and Sierraville soils. The Aspen Variant and Umpa soils are skeletal. Aspen Variant soils have mollic epipedons and Sierraville soils have argillic horizons.

Taxonomic class. These soils are fine-silty, mixed, frigid Typic Xerochrepts.

Typical pedon of Rouen Variant silt loam in a unit of Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced, in the NE 1/4 NW 1/4 of section 10, T. 19 N., R. 17 E.

O1 1 inch to 0; fresh and decomposed litter.

A11 0 to 3 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; many vary fine interstitial pores; 5 percent pebbles; neutral (pH 7.0); clear wavy boundary.

A12 3 to 12 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; many very fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B21 12 to 30 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist, moderate medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine and coarse roots; common very fine interstitial pores; 5 percent pebbles and 2 percent cobbles; slightly acid (pH 6.3); gradual wavy boundry.

B22 30 to 50 inches; very pale brown (10YR 7/3) gravelly silt loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; few very fine roots; common very fine interstitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.3).

Range in characteristics. Depth to weathered rock ranges from 40 to 60 inches.

The A horizon has colors of 10YR 5/2, 5/3, 6/2, or 6/3. It is very fine sandy loam, silt loam, or loam with 0 to 5 percent gravel and slightly acid to mildly alkaline.

The B horizon has colors of 10YR 7/3, 2.5Y 7/4, or SYR 7/2. It is loam, silt loam, or silt loam and medium acid or slightly acid. Some pedons have B1 horizons.

SATTLEY SERIES

The Sattley series consists of deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic conglomerate, basaltic flow rock, or colluvium from these sources. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers, consisting of Jeffrey pine, ponderosa pine, and incense cedar. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 20 to 40 inches, the average annual air temperature is about 43 to 45 degrees F., and the average frost-free season is 30 to 60 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Sattley soils are similar to the Trojan soils and are associated with the Kyburz soils. Kyburz soils do not have mollic epipedons and are less than 40 inches deep. Trojan soils are not skeletal.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Ultic Argixerolls.

Typical pedon of Sattley stony sandy loam in a unit of Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes, 1.5 miles south of Loyalton: 2000 feet southwest of the northeast corner of section 24, T. 21 N., R. 15 E.

O1 and O2 4 inches to 0; fresh pine needles, twigs and litter, decomposed forest litter, duff and humus.

Al 0 to 10 inches; grayish brown (10YR 5/2) stony sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common very fine and few fine tubular and interstitial pores; 25 percent stones, cobbles, and pebbles; slightly acid (pH 6.3); gradual smooth boundary.

A3 10 to 15 inches; grayish brown (10YR 5/2) stony sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; common very fine and few fine tubular and interstitial pores; 30 percent stones, cobbles, and pebbles; medium acid (pH 6.0); gradual smooth boundary.

B1t 15 to 22 inches; light brownish gray (10YR 6/2) very stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly sticky and slightly plastic; common very fine and coarse roots; common very fine and few fine tubular and interstitial pores; few thin clay films lining pores, few colloid stains on mineral grains; 35 percent stones, cobbles, and pebbles; medium acid (pH 6.0); clear smooth boundary.

B2t 22 to 40 inches; light brownish gray (10YR 6/2) extremely stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and coarse roots; common very fine and few fine tubular and interstitial pores; common thin clay films lining pores and on faces of peds; 65 percent stones, cobbles, and pebbles; medium acid (pH 5.8); gradual smooth boundary.

B3 40 to 46 inches; light brownish gray (10YR 6/2) extremely stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common very fine and few fine tubular and interstitial pores; common thin clay films lining pores; 65 percent stones, cobbles, and pebbles; medium acid (pH 5.8).

R 46 inches; cemented andesitic conglomerate.

Range in characteristics. Depth to a lithic contact is 40 to 60 inches.

The Al horizon has colors of 10YR 5/3, 5/2, 5/1, 4/3, 4/2, 4/1, 7.5YR N5/, N4/, 5/4, 5/2, 4/4, or 4/2. It is slightly acid or medium acid.

The B2t horizon has colors of 10YR 6/2, 5/2, 5/3, or 7.5YR 5/2. It is very or extremely stony sandy clay loam or clay loam. The B2t has subangular blocky structure and is medium acid or strongly acid.

SIERRAVILLE SERIES

The Sierraville series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic volcanic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly eastside pine and brush, consisting of Jeffrey pine and ponderosa pine with sagebrush and bitterbrush. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 18 to 40 inches, the average annual air temperature is about 43 to 45 degrees F., the average frost-free season is 25 to 60 days.

Permeability is moderately slow. Available water capacity is low to high, runoff is medium to rapid, and the erosion potential is high.

The Sierraville soils are similar to the Aiken, Hoda, and Sites soils and associated with the Kyburz and Trojan soils. Aiken, Hoda, and Sites soils have a mesic soil temperature regime. Kyburz soils are 20 to 40 inches deep. Trojan soils have mollic epipedons.

Taxonomic class. These soils are fine, montmorillonitic, frigid Ultic Haploxeralfs.

Typical pedon of Sierraville stony sandy loam in a unit of Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes, in the SE 1/4 NW 1/4 of section 30, T. 18 N., R 17 E.

O1 and O2 2 inches to 0; fresh pine needles, twigs and litter, duff and humus.

Al 0 to 3 inches; reddish brown (5YR 5/3) stony sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent stones; slightly acid (pH 6.5); clear smooth boundary.

A3 3 to 9 inches; reddish brown (2.5YR 4/4) stony loam, dark reddish brown (2.5YR 3/4) moist; weak. fine subangular blocky structure and moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many very ftne and fine tubular and interstitial pores; 15 percent stones; slightly acid (pH 6.5); clear smooth boundary.

B1t 9 to 24 inches; reddish brown (2.5YR 4/4) stony clay loam, dusky red (10R 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common fine roots, many medium and coarse roots; many very fine and fine tubular and interstitial pores; common thin clay films lining pores; 20 percent stones; slightly acid (pH 6.4); clear wavy boundary.

B2lt 24 to 48 inches; weak red (l0R 5/3) clay loam, dusky red (10R 3/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots, common medium and coarse roots; many very fine and fine tubular and interstitial pores; many thin clay films lining pores and few clay films on faces of peds; slightly acid (pH 6.3); gradual smooth boundary.

B22t 48 to 75 inches; weak red (10R 4/3) clay, dark red (10R 3/6) moist; moderate fine angular blocky structure; hard, firm, very sticky and plastic; few fine and coarse roots, common medium roots; common very fine and fine tubular pores, many very fine interstitial pores; many thin clay films lining pores and on faces of peds; medium acid (pH 6.0); abrupt irregular boundary.

R 75 inches; light gray, porous and vesicular, slightly weathered andesite.

Range in characteristics. Thickness of the rooting zone ranges from 40 to 80 inches. Rock fragment content ranges from 5 to 30 percent throughout the profile.

The A horizon has colors of 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/4, 4/3, 3/4, 3/3, 3/2, 2.5YR 5/4, 4/4, or 3/4. It is sandy loam or loam.

The B2t horizon has colors of 5YR 5/4, 5/3, 4/4, 4/3, 2.5YR 5/4, 5/2, 4/4, 4/2, 10R 5/4, 5/3, 4/4, or 4/3. It is clay loam or clay.

The Sierraville soils in map units TWE, TWF, and TWF6 in this survey area are taxajuncts to the Sierraville series because they have 10YR colors throughout the profile. This difference, however, does not significantly affect use and management.

SITES SERIES

The Sites series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metamorphic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, Douglas-fir, black oak, and tan oak. Elevation is 1,500 to 5,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is 54 to 60 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow to slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Sites soils are similar to the Aiken, Cohasset, and Sierraville soils and are associated with the Boomer, Hoda, Holland, Jocal, Mariposa, and Musick soils. Aiken soils have a clay content of the argillic horizon which does not decrease by more than 8 percent of the maximum to a depth of 90 inches. Boomer and Holland soils have greater than 35 percent base saturation in the argillic horizon and are fine-loamy. Cohasset soils are fine-loamy with more than 35 percent base saturation and have volcanic parent material. Hoda and Musick soils are developed from granitic parent material and have 35 to 60 percent base saturation in the argillic horizon. Jocal and Mariposa soils are fine-loamy and Manposa soils are less than 40 inches deep and have a lithic contact intermittently above 20 inches in part of each pedon. Sierraville soils have a frigid soil temperature regime and have volcanic parent material.

Taxonomic class. These soils are clayey, oxidic, mesic Xeric Haplohumults.

Typical pedon of Sites clay loam in a unit of Sites-Josephine complex, 2 to 30 percent slopes, about one mile east of Bullards Bar Dam in the SW 1/4 SW 1/4 of section 30, T. 18 N., R. 8 E.

O1 2 inches to 0; litter and duff.

A1 0 to 9 inches; reddish brown (5YR 4/4) clay loam, datk reddish brown (2.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots, many medium and coarse roots; many very fine tubular and interstitial pores; 10 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

B2lt 9 to 33 inches; yellowish red (5YR 5/6) gravelly clay, red (2.5YR 4/6) moist; strong moderate and coarse subangular blocky structure; hard, firm, very sticky and plastic; common very fine, medium, and coarse roots; common very fine tubular pores; continuous thick clay films on faces of peds and lining pores; 15 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 33 to 45 inches; yellowish red (5YR 5/6) gravelly clay, red (2.5YR 4/6) moist; strong moderate and coarse subangular blocky structure; hard, firm, very sticky and plastic; common medium and coarse roots; common very fine tubular pores, few medium tubular pores; continuous thick clay films on faces of peds and lining pores; 25 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

Cr 45 inches; weathered metasedimentary rock.

Range in characteristics. Depth to weathered metasedimentary rock ranges from 40 to 65 inches.

The A horizon has dry colors of 7.5YR 5/4, 5/2, 4/4, 4/2,3/4, 3/2, 5YR 5/4,5/3, 4/4, or 4/3 and moist colors of SYR 5/6, 4/6, 3/4, 3/3, 3/2, 2.5YR 3/4, or 2/4. It is sandy loam, loam, or clay loam with 0 to 25 percent rock fragments and slightly acid or medium acid.

The B2t horizon has colors of 5YR 5/6, 5/4, 5/3, 4/6, 4/4, 4/3, 2.5YR 5/6, 5/4, 4/6, or 4/4. It is clay loam or clay with 5 to 30 percent tack fragments. The B2t horizon is medium acid to very strongly acid becoming more acid with depth. Base saturation is about 15 to 35 percent.

SMOKEY SERIES

The Smokey series consists of moderately deep, well drained soils on mountainsides and outwash terraces. These soils formed in residuum weathered from metasedimentary rock and glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-open stands of high elevation mixed conifers and shrubs, consisting of sugar pine, Jeffrey pine, white fir, red fir, huckleberry oak, and pinemat manzanita. Elevation is 5,500 to 7,200 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 42 to 47 degrees F., and the average frost free season is 75 to 120 days.

Permeability is moderate. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Smokey soils are similar to the Chaix, Hurlbut, and Mariposa soils and are associated with the Smokey Variant and Woodseye soils. Chaix, Hurlbut, and Mariposa soils have a mesic soil temperature regime and are not skeletal. Smokey Variant soils are greater than 40 inches deep. Woodseye soils are less than 20 inches deep.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Smokey gravelly sandy loam in a unit of Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes, about 25 miles northeast of Foresthill, 2.4 miles east of the interesection of the American Hill Road and the Secret Ridge Road, near the center of section 5, T. 15 N., R. 13 E.

O1 1 inch to 0; litter and duff.

Al 0 to 4 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate coarse granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 18 percent pebbles; strongly acid (pH 5.2); clear smooth boundary.

B2 4 to 14 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and coarse roots; common fine interstitial and tubular pores; common thin clay films lining pores and on faces of peds; 40 percent pebbles; very strongly acid (pH 5.0); clear irregular boundary.

C1 14 to 24 inches; yellow (l0YR 7/6) very gravelly silt loam, brownish yellow (10YR 6/6) moist; massive; slightly hard, friable, sticky and plastic; common medium and coarse roots; few very fine and fine interstitial and tubular pores; 60 percent pebbles; very strongly acid (pH 4.5); abrupt wavy boundary.

C2r 24 inches; weathered metasedimentary rock.

Range in characteristics. Depth to a paralithic contact ranges from 20 to 40 inches. Base saturation is less than 60 percent throughout the profile. Stones and cobbles range from 5 to 55 percent throughout the profile.

The A horizon has dry colors of l0YR 5/3, 4/3, 3/3, 7.SYR 5/4, 4/4, or 4/3 and moist colors of l0YR 3/3, 3/2, 7.5YR 5/4, 5/3, 3/2, 3/4 5YR 5/4, or 4/4. It is sandy loam, silt loam, or loam with 10 to 40 percent gravel and 0 to 15 percent cobbles and is medium acid to very strongly acid.

The B horizon has dry colors of l0YR 6/4, 6/6, 5/4, 5/6, 7.5YR. 6/4, 5/4, or 4/4 and moist colors of l0YR 5/6, 5/4, 7.5YR 4/4, 5/4, 5 YR 4/6, or 5/6. It is loam or silt loam with 30 to 50 percent gravel and 0 to 10 percent cobbles and is medium acid to very strongly acid.

The C horizon has dry colors of l0YR 7/6, 6/4, 6/3, or 7.5YR 4/4 and moist colors of l0YR 6/6, 5/6, 6/4, or 6/3. It is is silt loam, sandy loam, or loam with 40 to 60 percent gravel and 0 to 20 percent cobbles and is strongly acid to very strongly acid.

SMOKEY VARIANT

The Smokey Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 30 percent.

The vegetation is mainly semi-dense stands of high elevation mixed conifers and shrubs, consisting of sugar pine, Jeffrey pine, white fir, red fir, huckleberry oak, and pinemat manzanita. Elevation is 5,500 to 7,200 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 40 to 47 degrees F., and the average frost free season is 75 to 120 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Smokey Variant soils are similar to the Hurlbut soils and associated with the Deadwood, Mariposa, Smokey, and Woodseye soils. Deadwood and Woodseye soils are less than 20 inches deep and Deadwood soils have a mesic soil temperature regime. Hurlbut and Smokey soils are less than 40 inches deep. Hurlbut soils have a mesic soil temperature regime. Mariposa soils have argillic horizons and have a lithic contact intermittently above 20 inches in part of each pedon.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Smokey Variant gravelly sandy loam in a unit of Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes, near the center of section 5, T. 15 N., R. 13 E.

O1 1 1/2 inches to 0; litter and duff.

Al 0 to 3 inches: dark brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 18 percent pebbles; slightly acid (pH 6.3); abrupt smooth boundary.

B2 3 to 17 inches; yellowish brown (l0YR 5/4) very gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine interstitial and tubular pores: 40 percent pebbles, 5 percent cobbles and stones; neutral (pH 6.7); abrupt wavy boundary.

Cl 17 to 34 inches; very pale brown (l0YR 7/4) very gravelly sandy loam, yellowish brown (l0YR 5/6) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; common very fine interstitial and tubular pores; 55 percent pebbles, 5 percent cobbles; neutral (pH 6.7); gradual irregular boundary.

C2 34 to 47 inches; pale yellow (2.5Y 8/4) very gravelly silt loam, brownish yellow (10YR 6/6) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine interstitial and tubular pores; 65 percent pebbles; slightly acid (pH 6.3); gradual irregular boundary.

C3r 47 to 69 inches; highly weathered metasedimentary rock with pockets of soil; few fine and medium roots, and common fine and medium roots in pockets of soil.

Range in characteristics. The effective rooting depth ranges from 40 to 60 inches. The base saturation is less than 50 percent between a depth of 10 and 30 inches.

The A horizon has dry colors of l0YR 4/3 or 7.5YR 6/4 and moist colors of l0YR 3/2 or 7.5YR 5/4. It is sandy loam or loam with 15 to 50 percent gravel.

The B horizon has dry colors of 7.5YR 7/8, l0YR 7/6, or 5/4 and moist colors of 7.5YR 6/8, 4/4, or 10YR 6/6. It is loam with 40 to 60 percent gravel and 5 to 10 percent cobbles and stones.

TAHOMA SERIES

The Tahoma series consists of deep, well drained soils on mountainsides and plateaus. These, soils formed in residuum weathered from basic volcanic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense to semi-dense stands of mixed conifers, consisting of red fir, white fir, and Jeffrey pine with an understory of manzanita and squaw carpet. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is about 38 to 44 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow to rapid, and the erosion potential is high.

The Tahoma soils are similar to the Kyburz and Martis soils and associated with the Fugawee soils. Fugawee and Kyburz soils are both less than 40 inches deep. Martis soils have an umbric epipedon and are formed in glacial till.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Tahoma gravelly loam in a unit of Fugawee-Tahoma complex, 2 to 30 percent slopes, about 1 mile on lower Fibreboard Road off of Sagehen Summit, 75 feet east of road, in the SE l/4 NW 1/4 of section 32, T. 19 N., R. 16 E.

O1 1 inch to 0; fresh and decomposed litter.

Al 0 to 2 inches; brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many medium interstitial pores, many very fine tubular and interstital pores; 25 percent pebbles; slightly acid (pH 6.5); abrupt wavy boundary.

B1 2 to 8 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; many medium interstitial pores, many very fine tubular and interstitial pores; 15 percent pebbles, 10 percent cobbles and stones; slightly acid (pH 6.5); clear wavy boundary.

B21t 8 to 14 inches; brown (7.5YR 5/4) gravelly clay loam, reddish brown (5YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium roots; many medium interstitial pores, many very fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; 20 percent pebbles, 10 percent cobbles and stones; neutral (pH 6.7); clear wavy boundary.

B22t 14 to 25 inches; strong brown (7.5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots; common very fine and fine tubular and interstitial pores; continuous moderately thick clay films lining pores, many thin clay films on faces of peds; 15 percent pebbles, 10 percent cobbles and stones; neutral (pH 6.7); gradual wavy boundary.

B3t 25 to 41 inches; strong brown (7.5YR 6/8) very gravelly clay loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots; few medium intersititial pores, few very fine and fine tubular and interstitial pores; few thin clay films lining pores; 35 percent pebbles; neutral (pH 6.7); abrupt irregular boundary.

Cr 41 inches; highly weathered andesitic tuff.

Range in characteristics. Depth to weathered rock ranges from 40 to 60 inches.

The A horizon has colors of 10YR 5/2, 4/4, 4/3, 4/2, 3/3; 7.5YR 4/2, or 5/4. It is sandy loam or loam with 15 to 60 percent rock fragments and is slightly acid or medium acid.

The Bt horizon has colors of 7.5YR 5/4, 4/4, 10YR 6/2, SYR 6/3, or 6/6. It is loam, sandy clay loam, or clay loam with 0 to 25 percent rock fragments.

TAHOMA VARIANT

Tahoma Variant soils are deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer, consisting of red fir, white fir, incense cedar, and sugar pine. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 52 to 56 degrees F., and the average frost-free season is 150 to 175 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Tahoma Variant soils are similar to the Fugawee, Kyburz, and Tahoma soils and associated with the Chaix Variant and Hotaw Variant soils. Chaix Variant, Fugawee. Hotaw Variant, and Kyburz soils are moderately deep. Tahoma soils have less than 16 percent coarse and very coarse sand and base saturation above 25 percent in the argillic horizon.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Halploxeralfs.

Typical pedon of Tahoma Variant gravelly loam in a unit of Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes, in section 10, T. 18 N., R. 11 E.

O1 3 inches to 0; litter and duff.

Al 0 to 5 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, many fine and medium roots; common very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

Bl 5 to 14 inches; strong brown (7.5YR 5/6) gravelly loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and plastic; common fine and medium roots; common very fine and fine interstitial pores; few thin clay films as bridges between minerals grains: 25 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

B21t 14 to 26 inches; strong brown (7.5YR 5/8) clay loam, reddish yellow (7.5YR 6/6) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and very plastic; few medium and coarse roots; common very fine and fine, and few medium interstitial and tubular pores; many moderately thick and few thick clay films on faces of peds; 10 percent pebbles; medium acid (pH 5.7); gradual wavy boundary.

B22t 26 to 37 inches; strong brown (7.5YR 5/8) clay loam, reddish yellow (7.5YR 6/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and very plastic; few medium and coarse roots; common very fine and fine tubular and interstitial pores; many moderately thick clay films on faces of peds; 5 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B3t 37 to 48 inches; yellow (10YR 7/6) clay loam, yellowish brown (10YR 5/8) moist; massive; slightly hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine, and few medium interstitial and tubular pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 10 percent pebbles; very strongly acid (pH 5.0); clear wavy boundary.

Cr 48 inches; highly weathered granitic rock.

Range in characteristics. Depth to weathered granitic rock is from 40 to 80 inches.

The A horizon has dry colors of 7.5YR 7/8, 7/6, 6/8, 6/6, 5/8, 5/6, 5/4, 4/6, 4/4, 5YR 7/6, or 6/6 and moist colors of 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 5/6, 4/6, 3/4, or 3/3. It is loam or sandy loam with 10 to 35 percent gravel and is slightly acid or medium acid.

The B2t horizon has colors of 7.5YR 7/8, 7/6, 6/8, 6/6, 5/8, 5/6, 4/6, 5YR 7/8, 7/6, 6/8, or 6/6. It is clay loam with 5 to 15 percent gravel and is medium acid to very strongly acid.

TALLAC SERIES

The Tallac series consists of deep, moderately well drained soils on lateral and terminal glacial moraines and outwash. These soils farmed in material weathered from glacial deposits. Slope rtnges from 2 to 60 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, Jeffrey pine, and some western white pine. Elevation is 5,500 to 9,000 feet. The average annual precipitation is about 40 to 80 inches, the average annual air temperature is about 39 to 45 degrees F, the average frost-free season is 30 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is slow to rapid, and the erosion potential is high.

The Tallac soils are similar to the Putt and Zeibright soils and are associated with the Tinker, Waca, and Woodseye soils. Putt and Zeibright soils have a mesic soil temperature regime. Putt and Tinker soils are less than 40 inches deep to a silica cemented pan. Woodseye soils are less than 20 inches deep to lithic contact. Waca soils are influenced by pyroclastic materials.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Pachic Xerumbrepts.

Typical pedon of Tallac very gravelly sandy loam in a unit of Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes, about two miles southwest of Truckee; 1,000 feet west of Highway 89 along the Jackass Timber Sale Road in the SW 1/4 NE 1/4 of section 21, T. 17 N., R. 16 E.

O1 1 inch to 0; fresh and decomposed conifer needles.

A11 0 to 6 inches; very dark gray (10YR 3/1) very gravelly sandy loam, black (l0YR 2/1) moist; moderate medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; 40 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

A12 6 to 16 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine, fine, and medium roots; many very fine interstitial pores; 5 percent cobbles, 40 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

A13 16 to 22 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and slightly plastic; common very fine, fine, and coarse roots; common fine interstitial pores; 5 percent stones, 35 percent cobbles, 25 percent pebbles; slightly acid (pH 6.3); gradual wavy boundary.

Cl 22 to 41 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common very fine, fine, medium, and few coarse roots; common fine interstitial pores; 15 percent stones, 25 percent cobbles, 30 percent pebbles; slightly acid (pH 6.3); abrupt wavy boundary.

C2si 41 to 60 inches; light yellowish brown and yellowish brown (10YR 6/4, 5/6, 5/8) weakly cemented till; hard, friable; few fine and medium roots.

Range in characteristics. Thickness of the solum is 20 to 30 inches.

The A horizon has dry colors of 10YR 5/2, 5/3, 4/1, 4/2, 4/3, 3/1, 3/2, or 3/3 and moist colors of 10YR 3/1, 3/2, 3/3, or 2/1. It is very gravelly sandy loam, gravelly sandy loam, sandy loam, very cobbly loam, gravelly loam, or loam.

The upper C horizon has dry colors of 10YR 6/3, 6/4, 5/3, 5/4. 4/3, or 3/3 and moist colors of l0YR 4/3, 4/4, 3/2, 3/3, or 3/4. It is very gravelly sandy loam, gravelly sandy loam, gravelly fine sandy loam, very gravelly loam, gravelly loam, or loam.

TINKER SERIES

The Tinker series consists of moderately deep, well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense stands of conifers, consisting of lodgepole pine, red fir, and western white pine with an understory of huckleberry oak. Elevation is 6,000 to 8,600 feet. The average annual precipitation is 50 to 80 inches, the average annual air temperature is 38 to 46 degrees F, the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to rapid, the erosion potential is high.

The Tinker soils are similar t6 the Putt and Zeibright soils and are associated with the Tallac, Waca, and Woodseye soils. Putt and Zeibright soils have a mesic soil temperature regime and Zeibright soils are over 40 inches deep. Tallac soils are over 40 inches to a pan. Waca soils are influenced by pryoclastic materials. Woodseye soils are less than 20 inches to a lithic contact.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Andic Haplumbrepts.

Typical pedon of Tinker cobbly loam in a unit of Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes. 2 miles northeast of Soda Springs; 1/8 mile southwest of Boreal Ridge ski area parking lot on sewage line right-of-way, near the center of the NW 1/4 NW 1/4 of section 24, T. 17 N., R. 14 E.

O1 1 inch to 0; litter and duff.

A11 0 to 5 inches; brown (10YR 4/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 10 percent pebbles, 25 percent cobbles and stones; medium acid (pH 5.7); gradual wavy boundary.

A12 5 to 21 inches; brown (l0YR 4/3) very cobbly loam, very dark grayish brown (l0YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; common very fine interstitial pores; 15 percent pebbles, 45 percent cobbles and stones; medium acid (pH 6.0); clear wavy boundary.

B2 21 to 33 inches; reddish brown (7.5YR 6/6) very cobbly loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, nonsticky and non-plastic; few medium roots; common very fine interstitial pores; 15 percent pebbles, 45 percent cobbles and stones; slightly acid (pH 6.5); abrupt wavy boundary.

C1si 33 to 45 inches; pale olive (5Y 6/3) weakly cemented very cobbly coarse sandy loam, olive (5Y 4/3) moist; massive; very hard, very firm, nonsticky and nonplastic; few medium roots on surface of horizon; few very fine and fine interstitial pores; silica coating on upper surface of horizon; 35 percent pebbles, 25 percent cobbles and stones; medium acid (pH 6.0); clear wavy boundary.

C2 45 to 51 inches; yellow (10YR 7/8) very cobbly coarse sandy loam, brownish yellow (10YR 6/8) moist; massive; hard, firm nonsticky and non-plastic; few fine and medium roots; few very fine and fine interstitial pores; 25 percent pebbles, 25 percent cobbles and stones; medium acid (pH 6.0); abrupt irregular boundary.

C3 51 to 63 inches; very pale brown (10YR 7/4) extremely cobbly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, nonsticky and nonplastic; few fine roots; no pores noted; 40 percent pebbles; 30 percent cobbles and stones; medium acid (pH 6.0).

Range in characteristics. Depth to the silica cemented horizon is from 22 to 40 inches. The umbric epipedon is 20 to 26 inches thick and the base saturation is less than 50 percent throughout the profile.

The A horizon has colors of 10YR 5/3, 5/2, 4/4, 4/3, 4/2, 3/3, or 3/2. It is coarse sandy loam, sandy loam, or loam with 10 to 60 percent rock fragments.

The upper C horizon has colors of 10YR 7/8, 7/4, 7/3, 6/3, 5/6, 5/4 7.5YR 6/6, or 5Y 6/3. It is coarse sandy loam, sandy loam, or loam with 35 to 80 percent rock fragments. The silica cemented horizon has mixed colors of 10YR 6/3, 5/6, 5/4, or 5Y 6/3.

TOIYABE SERIES

The Toiyabe series consists of shallow, somewhat excessivley drained soils on mountainsides. These soils formed in material weathered from granitic rock. Slopes range from 2 to 75 percent.

The vegetation is mainly mixed brush and widely spaced high elevation mixed conifers, consisting of greenleaf manzanita, prostrate manzanita, squaw carpet, Jeffrey pine, white fir, incense cedar, red fir, or ponderosa pine. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 20 to 40 inches, the average annual air temperature is about 36 to 42 degrees F., and the average frost-free season is 15 to 20 days.

Permeability is rapid. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high to very high.

The Toiyabe soils are similar to the Meiss, Ledmount, Chawanakee, and Ledmount Variant soils and are associated with the Haypress soils. Haypress soils are greater than 40 inches deep and have mollic epipedons. Chawanakee and Ledmount soils have a mesic soil temperature regime. Meiss and Ledmount Variant soils have volcanic parent material and are influenced by vitric pyroclastic materials.

Taxonomic class. These soils are mixed, frigid, shallow Typic Xeropsamments.

Typical pedon of Toiyabe gravelly loamy coarse sand in a unit of Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes, in the NW1/4NE1/4 of section 15, T. 20 N., R. 17 E.

O1 1 inch to 0; litter and duff.

Al 0 to 8 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many very fine interstitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Cl 8 to 16 inches; pale brown (10YR 6/3) cobbly loamy coarse sand, brown (10YR 4/3) moist; single grained; loose; common fine and medium roots; many very fine interstitial pores; 10 percent pebbles and 10 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

C2r 16 inches; highly weathered granitic rock.

Range in characteristics. The effective rooting depth is 10 to 20 inches. It is slightly acid to strongly acid.

The A horizon has dry colors of l0YR 4/2 or 5/2 and moist colors of 10YR 3/2. It is loamy coarse sand or gravelly loamy coarse sand.

The C horizon has dry colors of 10YR 6/2, 6/3, or 6/4 and moist colors of l0YR 4/3. It is gravelly or cobbly loamy coarse sand.

TROJAN SERIES

The Trojan series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic and basaltic conglomerate and breccia. Slope ranges from 2 to 50 percent.

The vegetation is mainly semi-dense stands of mixed conifers, consisting of Jeffrey pine, ponderosa pine, and white fir with bitterbrush and big sagebrush. Elevation is 4,800 to 6,400 feet. The average annual precipitation is about 15 to 40 inches, the average annual air temperature is 43 to 45 degrees F, the average frost-free reason is 25 to 75 days.

Permeability is moderately slow. Available water capacity is low to moderate; runoff is medium to rapid, the erosion potential is high.

The Trojan soils are similar to the Sattley soils and are assoicated with the Kyburz soils. Kyburz soils are less than 40 inches deep and do not have a mollic epipedon. Sattley soils are skeletal.

Taxonomic class. These soils are fine-loamy, mixed, frigid Ultic Argixerolls.

Typical pedon of Trojan gravelly sandy loam in a unit of Kyburz-Trojan complex, 30 to 50 percent slopes, one mile south of Loyalton, 25 feet south off an old logging road, 1,320 feet north of the center of section 24, T. 21 N., R. 15 E.

O1 and O2 3 inches to 0; mat of pine needles, twigs, and leaves, etc., decomposing with depth; abrupt, smooth boundary.

Al 0 to 3 inches; dark brown (7.5YR 4/2) gravelly sandy loam, dark reddish brown (5YR 3/2) moist; weak thick platy and moderate fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium roots, many very fine interstitial and tubular pores; slightly acid (pH 6.5); clear smooth boundary.

A3 3 to 10 inches; dark brown (7.5YR 4/2) gravelly sandy loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine and medium roots; few very fine and fine tubular pores; slightly acid (pH 6.5); clear smooth boundary.

81 10 to 21 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) and yellowish red (5YR 4/6) flecks when moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine and coarse roots, many medium roots; few fine and medium tubular pores, common very fine tubular pores; medium acid (pH 6.0); clear smooth boundary.

B2lt 21 to 37 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and coarse roots, common medium roots; few very fine tubular pores; common thin clay films lining pores and on faces of peds; medium acid (pH 6.0); gradual smooth boundary.

B22t 37 to 48 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) gravelly clay loam, reddish brown (5YR 4/3) moist; moderate fine and medium angular blocky structure; hard, firm, sticky and slightly plastic; few fine and medium roots; few very fine tubular pores; many thin clay films lining pores and on faces of peds; medium acid (pH 6.0) gradual smooth boundary.

B3t 48 to 61 inches; light brown (7.5YR 6/4) and reddish yellow (7.5YR 6/6) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; common very fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; medium acid (pH 6.0); clear smooth boundary.

C 61 to 67 inches; light brown (7.5YR 6/4) very gravelly loam, reddish brown (5YR 4/4) moist; firm, slightly sticky and slightly plastic; few thin clay films lining pores and as bridges between mineral grains; medium acid (pH 6.0); clear smooth boundary.

R 67 inches: slightly fractured andesite.

Range in characteristics. Depth to a lithic contact is 40 to 80 inches.

The A horizon has colors of 10YR 5/2, 5/3, 4/2, 4/3, 7.5YR 5/2, or 4/2. It is sandy loam or loam.

The B2t horizon has colors of 7.5YR 6/4, 5/4, 6/6, 5/6, 5YR 6/4, 5/4, or 6/6. It is loam, clay loam, or sandy clay loam and slightly acid to medium acid.

UMPA SERIES

The Umpa series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from coarse grain andesite rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly high elevation mixed conifers, consisting of red fir, white fir, and western white pine. Elevation is 7,000 to 8,500 feet. The average annual precipitation is about 35 to 45 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Umpa soils are associated with the Fugawee, Jorge, Tahoma, and Waca soils. Fugawee and Tahoma soils have argillic horizons and are not skeletal. Jorge soils are deeper than 40 inches and are formed on Latite flow rock. Waca soils have umbric epipedons.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Umpa stony sandy loam in a unit of Umpa stony sandy loam, 2 to 30 percent slopes, about 9 miles southwest of Truckee in the NE l/4 NE l/4 of section 11, T. 16 N., R. 15 E.

O1 1 inch to 0; fir litter and duff.

A11 0 to 3 inches; dark brown (10YR 3/3) stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common fine interstitial pores; 10 percent stones, 10 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

A12 3 to 8 inches; brown (10YR 5/3) gravelly sandy loam,dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots, few medium roots; common fine interstitial pores; 10 percent stones. 15 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B21 8 to 16 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots, few coarse roots; few fine and medium tubular pores, common fine interstitial pores; 5 percent cobbles, 5 percent stones and 20 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22 16 to 24 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few fine and medium tubular pores, common fine interstitial pores; 10 percent cobbles, 5 percent stones and 25 percent pebbles; medium acid (ph 6.0); abrupt wavy boundary.

Cr 24 to 36 inches; weathered coarse-grained andesite.

R 36 inches; hard fractured andesite.

Range in characteristics. Soil depth to bedrock ranges from 20 to 40 inches, Stones and boulders cover 0 to 10 percent of the surface area. Rock fragments range from 15 to 60 percent throughout the profile and average more than 35 percent.

The A horizon has dry colors of 10YR 5/3, 4/2, 3/3, 7.5YR 6/2, 5/2, or 5YR 6/2, and moist colors of 10YR 3/2, 3/3, 2/2, 7.5YR 3/2, or 5YR 3/4. It is sandy loam or loam and structure is weak to moderate fine granular.

The B2 horizon has dry colors of l0YR 6/3, 7.5YR 7/2, 6/2, 5YR 6/3, or 6/2 and moist colors of 10YR 4/3, 5/1, 5/2, 7.5YR 4/2, 5YR 6/3, or 4/3. It is sandy loam or loam and structure is weak medium subangular blocky.

WACA SERIES

The Waca series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic mudfiows and rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense to dense stands of high elevation mixed conifers consisting of Jeffrey pine, white fir, sugar pine, and western white pine in stands of red fir. Elevation is 6,000 to 9,000 feet. The average annual precipitation is about 35 to 80 inches, the average annual air temperature is about 36 to 42 degrees F., and the average frost free season is 25 to 125 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Waca soils are similar to the Ahatt, McCarthy, Portola, and Ponto Variant soils and are associated with the Meiss, Tallac, and Windy soils. Ahart and Portola soils are not skeletal. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Meiss soils are less than 20 inches deep to a lithic contact. Tallac soils are formed on glacial outwash material from mixed rock sources and do not have a lithic or paralithic contact. Windy and Tallac soils are greater than 40 inches deep.

Taxonomic class. These soils are medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Waca gravelly sandy loam in a unit of Waca-Windy complex, 30 to 50 percent slopes, approximately 1 mile southeast of Lake Valley Res., in the NW 1/4 SW1/4 of section 6, T. 16 N., R. 13 E.

O1 1 inch to 0; needles, twigs and duff.

A11 0 to 7 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and few fine roots; many very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A12 7 to 12 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

Cl 12 to 22 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots, few medium and coarse roots; many very fine interstitial pores; 35 percent pebbles, 10 percent cobbles, 5 percent stones; medium acid (pH 6.0); clear wavy boundary.

C2 22 to 32 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots, few medium and coarse roots; many very fine interstitial pores; 35 percent pebbles, 15 percent cobbles, 5 percent stones; medium acid (pH 6.0); clear wavy boundary.

C3r 32 inches; weathered andesitic tuff breccia with few medium roots in cracks 8 to 10 inches apart.

Range in characteristics. Depth to weathered andesitic tuff breccia or rhyolitic tuff ranges from 20 to 40 inches. The soil has less than 60 percent by weight vitric materials. Bulk density ranges from 0.85 to 1.00 gm/cc.

The A horizon has dry colors of 10YR 4/2, 4/3, 5/3, 5/2, 3/3, 4/4, or 5/4 and moist chromas of 2 or 3 in the upper seven inches. it is sandy loam or loam with 15 to 45 percent gravel.

The C horizon has colors of 10YR 6/4, 6/3, 5/8, 5/6, 5/4, 5/3, 4/4, 4/3, 7.5YR 5/4, or 5/3. it is medium acid or strongly acid fine sandy loam or loam with 35 to 70 percent gravel and cobbles.

WINDY SERIES

The Windy series consists of deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic mudfiow. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer, consisting of red fir and white fir. Elevation is 6,000 to 9,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 38 to 44 degrees F, and the average frost-free season is 30 to 60 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Windy soils are similar to the Ahart, McCarthy, Ponto Variant, Portola, and Taliac soils and associated with the Meiss and Waca soils. Ahart and Portola soils are less than 40 inches deep. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Meiss soils are less than 20 inches deep to a lithic contact and Waca soils are less than 40 inches deep. Tallac soils are formed on glacial outwash from mixed rock sources and do not have a lithic or paralithic contact.

Taxonomic class. These soils are medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Windy gravelly sandy loam in a unit of Waca-Windy complex, 2 to 30 percent slopes, in the NW 1/4 SW 1/4 of section 8, T. 18 N., R. 12 E.

O1 2 inches to 0; litter and duff.

Al 0 to 6 inches; dark brown (10YR 3/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic, few fine and medium roots; common very fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2 6 to 17 inches; brown (7.5YR 4/4) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots, few coarse roots; common very fine interstitial pores; 25 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

Cl 17 to 35 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common medium and coarse roots, few fine roots; common very fine tubular and interstitial pores; 35 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

C2 35 to 46 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium and coarse roots; common very fine tubular and interstitial pores; 50 percent pebbles, 5 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

C3r 46 inches; hard weathered andesitic tuff breccia, few coarse roots; few thin clay films on fracture planes.

Range in characteristics. Depth to weathered rock ranges from 40 to 80 inches. Textures throughout the profile are sandy loam, fine sandy loam, coarse sandy loam, or loam and axe cobbly, stony, gravelly, or very gravelly. Rock fragments range from 25 to 65 percent and averages more than 35 percent.

The A and B horizons have dry colors of 10YR 5/3, 4/3, 3/3, 7.5YR 5/4, or 4/4 and moist colors of 10YR 3/4, 3/3, 3/2, 7.5YR 3/4, or 3/2. Structure is weak to strong, very fine to medium granular or subangular blocky.

The O horizon has colors of 10YR 6/4, 7.5YR 6/6, or 6/4.

WOODSEYE SERIES

The Woodseye series consists of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed brush consisting of huckleberry oak, greenleaf manzanita, and squaw carpet. Elevation is 5,500 to 8,600 feet. The average annual precipitation is about 50 to 80 inches, the average annual air temperature is 38 to 46 degrees F., and the average frost free season is 25 to 75 days.

Permeability is moderate. Available water capacity is very low, runoff is rapid to very rapid and the erosion potential is high.

The Woodseye soils are similar to the Chawanakee, Deadwood, and Ledmount soils and are associated with the Smokey and Tinker soils. Chawanakee soils have granitic parent material, are not skeletal and have a paralithic contact. Deadwood soils have ochric epipedons and a mesic soil temperature regime. Ledmount soils have volcanic parent material and are dominated by vitric pyroclastic materials. Smokey soils have ochric epipedons and are 20 to 40 inches deep. Tinker soils have glacial outwash parent material and have a silica cemented pan within 20 to 40 inches of the soil surface.

Taxonomic class. These soils are loamy-skeletal mixed, frigid Lithic Xerumbrepts.

Typical pedon of Woodseye very gravelly sandy loam in a unit of Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes, 1 mile west of Cisco Grove; 700 feet southeast of microwave relay station on Cisco Butte, in the NW 1/4 SE 1/4 of section 30, T. 17 N., R. 13 E.

O1 1 inch to 0; leaf litter and duff.

A11 0 to 7 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark gray (10YR 3/1) moist; weak very fine and fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; 57 percent pebbles; medium acid (pH 5.7); gradual wavy boundary.

A12 7 to 14 inches; brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; 67 percent pebbles; slightly acid (pH 6.3); clear wavy boundary.

C 14 to 19 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; 92 percent pebbles; slightly acid (pH 6.3); abrupt wavy boundary.

R 19 inches; hard metasedimentary rock.

Range in characteristics. Depth to bedrock ranges from 9 to 20 inches. The umbric epipedon is 7 to 16 inches thick. Angular rock fragments less than 3 inches in size range from 35 to 95 percent throughout the profile.

The A horizon has colors of 10YR 5/3, 4/3, 4/2, 3/3, 3/2, or 3/1. It is very gravelly or extremely gravelly coarse sandy loam, sandy loam, or loam.

The C horizon has colors of 10YR 6/6, 6/4, 6/3, 5/3, 4/3, 7.5YR 5/8, 5/4, 5/2, 4/6, 4/4, or 4/2. It is very gravelly or extremely gravelly sandy loam or loam.

WOODSEYE VARIANT

The Woodseye Variant soils consist of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from coarse grained andesitic rock. Slope ranges from 30 to 75 percent.

The vegetation is mainly scattered brush and conifers, consisting of ceanothus with red fir and white fir. Elevation is 7,000 to 8,500 feet. The average annual precipitation is about 35 to 45 inches, the average annual air temperature is about 38 to 42 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid, and the erosion potential is high.

The Woodseye Variant soils are similar to the Chawanakee, Deadwood, and Ledmount soils. Chawanakee soils are not skeletal and have a mesic soil temperature regime. Deadwood soils have a mesic soil temperature regime. Ledmount soils have mollic epipedons and are dominated by vitric pyroclastic materials.

Taxonomic class. These soils are loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts.

Typical pedon of Woodseye Variant very gravelly sandy loam in a unit of Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes, in the NE 1/4 SE 1/4 of section 14, T. 16 N., R. 16 E.

O1 1 inch to 0; needles, leaves and twigs.

All 0 to 6 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (100YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 40 percent pebbles; slightly acid (pH 6.3); clear wavy boundary.

A12 6 to 14 inches; light brownish gray (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine interstial pores; 40 percent pebbles, 5 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

R 14 inches; hard volcanic rock.

Range in characteristics. Depth to bedrock ranges from 12 to 20 inches. Gravel, cobbles, and stones range from 35 to 65 percent throughout the profile.

The A horizon has dry colors of 10YR 6/2, 5/3, or 5/2 and moist colors of 10YR 3/3, 3/2, or 7.5YR 3/2. It is very gravelly or extremely gravelly sandy loam, coarse sandy loam, or sandy loam.

ZEIBRIGHT SERIES

The Zeibright series consists of deep and very deep, well drained soils on laterial and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwood, consisting of ponderosa pine, white fir, sugar pine, and black oak. Elevation is 3,500 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F, and the average frost-free season is 100 to 150 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is moderate to high.

The Zeibright soils are similar to the Tallac and Tinker soils and are associated with the Putt and McCarthy soils. McCarthy soils are found on volcanic parent material and are dominated by pyroclastic materials. Putt soils have a silica cemented pan within 20 to 40 inches of the soil surface. Tallac and Tinker soils have a frigid soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Entic Xerumbrepts.

Typical pedon of Zeibright gravelly fine sandy loam in a unit of Zeibright gravelly line sandy loam, 2 to 30 percent slopes, 3 miles west of Emigrant Gap, 0.4 miles southwest of State Highway 20 along Lowell Hill Road near center of NE 1/4 NE 1/4 of section 34, T. 17 N., R. 11 E.

O1 1 inch to 0; litter and duff.

A11 0 to 12 inches; dark brown (10YR 3/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and line interstitial pores; 15 percent pebbles, 5 percent cobbles and stones; slightly acid (pH 6.5); clear irregular boundary.

A12 12 to 21 inches; brown (10YR 4/3) gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 20 percent pebbles, 10 percent cobbles and stones; slightly acid (pH 6.5); gradual smooth boundary.

Cl 21 to 31 inches; yellowish brown (10YR 5/4) very cobbly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few very fine intersitial pores; 15 percent pebbles, 35 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); clear smooth boundary.

C2 31 to 59 inches; yellowish brown (10YR 5/6) very cobbly fine sandy loam, brown (7.5YR 4/4) moist; massive, soft, friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few very fine interstitial pores; 15 percent pebbles, 35 percent cobbles and 5 percent stones; strongly acid (pH 5.5); clear smooth boundary.

C3 50 to 62 inches; light yellowish brown (10YR 6/4) very cobbly fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; common medium and coarse roots few very fine interstitial pores; 15 percent pebbles, 20 percent cobbles and stones; strongly acid (pH 5.5).

Range in characteristics. The thickness of the umbric epipedon ranges from 10 to 20 inches. Rock fragment content ranges from 15 to 80 percent throughout the profile and averages more than 35 percent.

The A horizon has colors of 10YR 3/2, 3/3, 4/2, 4/3, 7.5YR. 3/2, 4/2, 5YR 3/3, or 4/3. It is gravelly fine sandy loam or sandy loam.

The C horizon has colors of 10YR 4/4, 5/4, 5/6, 6/3, 6/4, 7.5YR 4/4, 5/4, 6/4, 5YR 4/4, 5/4, 5/6, or 6/4. It is gravelly, very gravelly, or extremely gravelly fine sandy loam or sandy loam.

Glossary

Alluvial fan. A body of alluvium whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a plain.

Alluvium. Material, such as sand, silt, and clay deposited by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of calcium, magnesium, sodium, and potassium), expressed as a percentage of the total cation exchange capacity.

Basic igneous rock. Rock formed from the cooling and solidification of magma. It is high in iron and magnesium, and relatively low in silica.

Bedrock. A generalization for the rock, usually solid, that underlies the soil or other unconsolidated, superficial material.

Boulder. Rock fragments larger than 24 inches in diameter

Bulk density, soil. The mass of dry soil per unit bulk volume. The bulk volume is determined before drying to constant weight at 105 degrees centigrade. A unit of measure, usually grams per cubic centimeter or pounds per square foot.

Cation-exchange capacity. The sum total of exchangeable cations that a soil can absorb (sometimes called total-exchange capacity, base-exchange capacity, or cation absorption capacity), expressed in milliequivalents per 100 grams of soil or of other absorbing material, such as clay.

Cemented. Indurated; having a hard, brittle consistency because the particles are held together by cementing substances such as humus, calcium carbonate, or the oxides of silicon, iron, and aluminum. The hardness and brittleness persist even when wet.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter 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.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate, or lining pores or root channels. Synonyms: clay skin, clay skin.

Cobbles. Rounded or partially rounded fragments of rock 3 to 10 inches in diameter.

Colluvuim. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kind of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Consistence, soil. The feel of the soil and ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose. Noncoherent when dry or moist; does not hold together in a mass.

Friable. When moist, crushes easily under pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is dietinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to bull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard; little affected by moistening.

Deep. As a soil depth classification, 40 to 60 inches.

Duripan. A subsurface horizon that is cemented by silica to the point that fragments from the air-dry horizon will not slake after prolonged soaking in water or in hydrochloric acid.

Epipedon. Soil horizons that form at the surface. It is either darkened by organic matter or eluviated, or both.

Erosion. The wearing away of the land surface by wind, water, ice, and other geological agents.

Erosion potential. See Maximum erosion hazard rating.

Flood plain. The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

Gravel. Rounded or angular rock fragments less than 3 inches in diameter; an individual piece is a pebble.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil forming processes. The major horizons are as follows:

O horizon. An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon. The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

B horizon. The mineral horizon below an A 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. The combined A and B horizons are generally called the solum, or topsoil . If a soil does not have a B horizon, the A horizon alone is the solum.

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 A or B horizon. 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, the Roman numeral II precedes the letter C.

R layer. Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Igneous rock. Rock that has formed by the cooling and solidification of magma and that has not been changed appreciably since its formation.

Infiltration. The downward entry of water into the immediate surface of the soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Lithic contact. The boundary between soil and underlying rock which is a barrier to root penetration and water movement. Rock is essentially unweathered and can only be chipped by a spade.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Mapping unit. A kind of soil, a combination of kinds of soil, or miscellaneous land types that are delineated on the soil map.

Maximum erosion hazard rating. This is an estimate of the relative hazard of the loss of surface soil in an average year assuming no vegetative cover and no soil disturbance. The ratings are low, moderate, high, and very high.

Metamorphic rock. Rock derived from pre-existing rocks but that differ from them in physical, chemical, and mineralogical properties as a result of natural geological processes, principally heat and pressure, originating within the earth. The pre-existing rocks may have been igneous, sedimentary, or another form of metamorphic rock. Synonym: metasedimentary rock.

Moderately deep. As a soil depth classification, between 20 and 40 inches.

Moraine. An accumulation of drift, with an initial topographic expression of its own, built within a glaciated region, chiefly by the direct action of glacial ice. Examples are ground, lateral, recessional, and terminal moraines.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and impeded drainage.

Mudflow. A flowage of heterogeneous pyroclastic ma-

terial, lubricated with a large amount of water, on the flank of a volcano. Syn: lahar; Mehrten formation; andesitic mudflow; andesitic tuff breccia; tuff breccia mudflow.

Organic matter. Plant and animal residue in the sail in various stages of decomposition.

Outwash. Rock material removed from a glacier by meltwater and laid down by streams beyond the glacier itself.

Pan. A layer in a soil that is firmly compacted or very rich in clay. Frequently the word "pan" is combined with other words that more explicitly indicate the nature of the layers; for example, hardpan or dunpan, fragipan, claypan, and plowpan.

Paralithic contact. The boundary between soil and underlying weatheked rock which is a barrier to root penetration and water movement. Material retains rock structure but when moist can be dug with a spade.

Parent material. The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of soils is developed by pedogenic processes.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block.

Pedon. The smallest volume that can be called "a soil". A pedon is three dimensional and large enough to permit a study of all horizons. Its area ranges from about 1 square yard to 10 square yards, depending on the variability of the soil.

Permeability. The quality of the soil that enables water to move downward through the profile.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction. A measure of acidity or alkalinity of the 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 degree of acidity or alkalinity is expressed as: Extremely acid, below 4.5; Very strongly acid, 4.5-5.0; Strongly acid, 5.1-5.5; Medium acid, 5.8-8.0; Slightly acid, 6.1-6.5; Neutral, 6.6-7.3; Mildly alkaline, 7.4-7.8; Moderately alkaline, 7.9-8.4; Strongly alkaline, 8.5-9.0; and Very strongly alkaline, higher than 9.0.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be any mineral composition. The texture class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sediment. Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Shallow. As a soil depth classification, less than 20 inches.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slopes is the vertical distance divided by horizontal distance, then multiplied by 100.

Soil series. The basic unit of soil classification, being a subdivision of a family and consisting of soils which are essentially alike in all major profile characteristics except the texture of the A horizon.

Soil variant. A soil having properties sufficiently different from other known soils to justify a new series name but making up such a limited geographic area that establishing a new series is not justified.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stones. Detached rock fragments. If rounded, they are more than 10 inches in diameter, or if flattened, more than 17 inches along the long axis.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structures are: platy (laminated), prismatic (vertical axis of aggregates longer

than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grain (each grain by itself, as in dune sand) or massive (the particles adhering together without any regular cleavage, as in many claypans and hardpans.)

Subsoil. The soil between the surface layer and the uppermost substratum. All parts of B horizon above 80 inches, and any parts of A or C horizons between the surface layer and 40 inches or a more shallow substratum, are subsoil.

Substratum. A layer below 40 inches, or beneath the solum if the lower part of the solum is between 40 and 80 inches deep. Any parts of the solum below 80 inches are substrata. Bedrock, hardpan, and unconsolidated geologic materials that are in contrasting particle size classes relative to the surface soil or solum are substrata regardless of depth.

Surface layer. The uppermost part of the soil, usually designated as the A horizon, equivilent to the depth of soil moved in tillage and ranging in depth from 3 to 10 inches. Depth may be greater in some forest soils.

Terrace (geological). An old alluvial plain, ordinarily fiat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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. Unstratified glacial drift deposited directly by the ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.

Water Table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

TABLE 2. Map Unit Legend. Map Unit Area and Proportionate Extent

	Map Unit Name	Acres		Percent
ACE	Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes	3,083	:	0.2
ACF	Ahart-Waca, rhyolitic substratum complex, 30 to 50 percent slopes	2,761	:	0.2
ADE	Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes	2,097	:	0.2
ADF	Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 30 to 50 percent slopes	3,514	:	0.3
AEE	Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes	560	:	*
AEF	Ahart-Rock outorop-Ledmount Variant complex, 30 to 50 percent slopes	3,480	:	0.3
AIE	Aiken-Cohasset complex, 2 to 30 percent slopes	1,076	:	0.1
AIE5	Aiken-Cohasset complex, 2 to 30 percent slopes, altered	689	:	0.1
AQB	Aquolls and Borolls, 0 to 5 percent slopes	15,629	:	1.3
ARE	Aldi-Kuburz complex, 2 to 30 percent slopes	8,392	:	0.7
BCE	Bucking-Bucking Variant complex, 2 to 30 percent slopes	1,076	:	0.1
BCG	Bucking-Bucking Variant complex, 30 to 75 percent slopes	4,362	:	0.4
BDE	Bucking-Bucking Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes	1,333	:	0.1
BDF	Bucking-Bucking Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes	1,269	:	0.1
BME	Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes	4,808	:	0.4
BSE	Boomer-Boomer Variant-Sites complex, 2 to 30 percent slopes	2,662	:	0.2
BSF	Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes	1,760	:	0.1
BSG	Boomer-Boomer Variant complex, 50 to 75 percent slopes	407	:	*
CEE	Cello-Gefo-Aquolls complex, 2 to 30 percent slopes,	4,441	:	0.4
CGF	Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes	5,393	:	0.4
CHG	Chawanakee-Chaix-Hotaw complex, 30 to 75 percent slopes	3,797	:	0.3
CIF	Cinder land-Sierraville-Kyburz complex, 30 to 50 percent slopes	724	:	0.1
CKE	Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes	684	:	0.1
CKF	Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes	3,519	:	0.3
COE	Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes	7,921	:	0.6
COE5	Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, altered	1,819	:	0.1
COF	Cohasset-Aiken-Crozier complex, 30 to 50 percent slopes	1,284	:	0.1
CRB	Aldi Variant-Martis Variant-Aquolls complex, 2 to 5 percent slopes	1,001	:	0.1
CRE	Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes	2,414	:	0.2
CRF	Aldi Variant-Kyburz-Jorge Variant complex, 30 to 50 percent slopes	426	:	*
CSE	Crozier-Cohasset complex, 2 to 30 percent slopes	6,404	:	0.5
CSE5	Crozier-Cohasset complex, 2 to 30 percent slopes, altered	2,191	:	0.2
CSF	Crozier-Cohasset complex, 30 to 50 percent slopes	3,053	:	0.2
CSF6	Crozier-Cohasset complex, 30 to 50 percent slopes, terraced	570	:	*
CTE	Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes	8,223	:	0.7
CTE5	Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes, altered	1,943	:	0.2
CTG	Crozier-McCarthy-Cohasset complex, 30 to 75 percent slopes,	5,601	:	0.5
CUG	Crozier-Mariposa-Cryumbrepts, wet complex, 30 to 75 percent slopes	11,599	:	0.9
CYD	Cryumbrepts, wet, 2 to 15 percent slopes	922	:	0.1
DDH	Rock outcrop-Deadwood association, 50 to 100 percent slopes	16,258	:	1.3
DEG	Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes	71,114	:	5.7
DLE	Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes	1,784	:	0.1
DUE	Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes	1,081	:	0.1
DUF	Dubakella-Dubakella Variant-Rock outcrop complex, 30 to 50 percent slopes	2,860	:	0.2

	Map Unit Name	Acres	Percent
ETE	Euer-Aquolls-Martis Variant complex, 2 to 30 percent slopes	2,171	0.2
EUB	Euer-Martis Variant complex, 2 to 5 percent slopes	1,190	0.1
EUE	Euer-Martis Variant complex, 5 to 30 percent slopes	2,657	0.2
EVB	Inville-Martis Variant complex, 2 to 5 percent slopes	1,244	0.1
EWB	Inville-Riverwash-Aquolls complex, 2 to 5 percent slopes	2,340	0.2
EXE	Lorack Variant gravelly loam, 2 to 30 percent slopes	1,536	0.1
FFE	Ponto Variant-Neer complex, 2 to 30 percent slopes	416	*
FFF	Ponto Variant-Neer complex, 30 to 50 percent elopes	1,105	0.1
FGG3	Ponto Variant-Neer-Rock outcrop complex, 30 to 75 percent slopes, severely eroded	981	0.1
FJG2	Fugawee-Jorge-Rubble land complex, 30 to 75 percent slopes, eroded	362	*
FME	Fugawee sandy loam, 2 to 30 percent slopes	2,830	0.2
FME5	Fugawee sandy loam, 2 to 30 percent slopes, altered	99	*
FMF	Fugawee sandy loam, 30 to 50 percent slopes	1,690	0.1
FMF2	Fugawee sandy loam, 30 to 50 percent slopes, eroded	322	*
FRE	Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes	4,739	0.4
FRE5	Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes, altered	778	0.1
FRF	Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes	5,487	0.4
FRF2	Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, eroded	392	*
FRF6	Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, terraced	932	0.1
FTE	Fugawee-Tahoma complex, 2 to 30 percent slopes	16,189	1.3
FTF	Fugawee-Tahoma complex, 30 to 50 percent slopes	9,006	0.7
FUC	Kyburz-Trojan-Sierraville complex, 2 to 9 percent slopes	3,252	0.3
FUE	Kyburz-Trojan complex, 9 to 30 percent slopes	14,484	1.2
FUE5	Kyburz-Trojan complex, 2 to 30 percent slopes, altered	1,616	0.1
FUF	Kyburz-Trojan complex, 30 to 50 percent slopes	9,567	0.8
FUF6	Kyburz-Trojan complex, 30 to 50 percent slopes, terraced	55	*
FVE	Fugawee-Tahoma-Aquolls complex, 2 to 30 percent slopes	1,745	0.1
GBF	Cello Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes	1,814	0.1
GEC	Gefo-Aquolls-Cello complex, 2 to 9 percent slopes	996	0.1
GGF	Cello Variant-Rock outcrop complex, 30 to 50 percent slopes	872	0.1
GID	Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes	535	*
GRG	Rock outcrop, granitic	20,883	1.7
HAE	Haypress-Toiyabe complex, 2 to 30 percent slopes	1,566	0.1
HAG	Haypress-Toiyabe complex, 30 to 75 percent slopes	1,993	0.2
HAG2	Haypress-Toiyabe-Rock outcrop complex, 30 to 75 percent slopes, eroded	3,276	0.3
HBE	Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes	312	*
HBG	Haypress-Toiyabe-Cryumbrepts, wet complex, 30 to 75 percent slopes	818	0.1
HOE	Hoda-Musick complex, 2 to 30 percent slopes	3,143	0.3
HOF	Hoda-Musick complex, 30 to 50 percent slopes	1,205	0.1
HPE	Holland-Hoda-Hotaw complex, 2 to 30 percent slopes	1,651	0.1
HPF	Holland-Hoda-Hotaw complex, 30 to 50 percent slopes	4,218	0.3
HPF2	Holland-Hoda-Hotaw complex, 10 to 40 percent slopes, eroded	1,363	0.1
HPF5	Holland-Hoda-Aquolls complex, 2 to 40 percent slopes, altered	744	0.1
HRE	Horseshoe-Josephine-Mariposa complex, 2 to 30 percent slopes.	1,175	0.1
HSE	Huysink-Horseshoe-complex, 2 to 30 percent slopes	3,728	0.3
HSF	Huysink-Horseshoe complex, 30 to 50 percent slopes	1,636	0.1
HTF	Hotaw, rhyolitic substratum-McCarthy-Cryumbrepts, wet complex, 30 to 75 percent slopes	635	0.1
HUE	Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes	8,595	0.7
HUE3	Hurlbut, thin surface-Deadwood-Rock outcrop complex, 2 to 30 percent slopes, severely eroded	3,306	0.3
HUE5	Hurlbut, thin surface-Hurlbut-Deadwood complex, 2 to 30 percent slopes, altered	6,171	0.5

	Map Unit Name	Acres	Percent
HUG	Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes	71,441	5.7
HUG3	Hurlbut, thin surface-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, severely eroded	10,018	0.8
HUG5	Hurlbut, thin surface-Hurlbut-Deadwood complex, 30 to 75 percent slopes, altered	5,616	0.5
HYE	Pits, hydraulic	3,698	0.3
IME	Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes	1,403	0.1
IMG	Ledmount-McCarthy-Rock outcrop complex, 30 to 75 percent slopes	6,543	0.5
ISE	Forbes-Dubakella complex, 2 to 30 percent slopes	1,319	0.1
ISE5	Forbes-Dubakella complex, 2 to 30 percent slopes, altered	540	*
ISF	Forbes-Dubakella complex, 30 to 50 percent slopes	1,408	0.1
JSE	Jorge-Cryumbrepts, wet-Tahoma complex, 2 to 30 percent slopes	1,517	0.1
JSG	Jorge-Cryumbrepts, wet complex, 30 to 75 percent slopes	258	*
JTE	Jorge-Tahoma complex, 2 to 30 percent slopes	10,954	0.9
JTF	Jorge very stony sandy loam, 30 to 50 percent slopes	10,474	0.8
JUE	Jorge-Rubble land complex, 2 to 30 percent slopes	1,086	0.1
JUG	Jorge-Rubble land complex, 30 to 75 percent slopes	2,191	0.2
JWE	Jorge-Waca-Tahoma complex, 2 to 30 percent slopes	753	0.1
JWF	Jorge-Waca-Tahoma complex, 30 to 50 percent slopes	1,596	0.1
JXE	Jorge-Waca-Cryumbrepts , wet complex, 2 to 30 percent slopes	1,309	0.1
JXF	Jorge-Waca-Cryumbrepts, wet complex, 30 to 50 percent slopes	476	*
JYE	Jocal-Sites-Mariposa complex, 2 to 30 percent slopes	7,797	0.6
JYE5	Jocal-Sites-Mariposa complex, 2 to 30 percent slopes, altered	704	0.1
JYF	Jocal-Sites-Mariposa complex, 30 to 50 percent slopes	4,694	0.4
JZG	Jocal-Josephine Variant-Cryumbrepts, wet complex, 50 to 75 percent slopes	18,518	1.5
KIE	Kinkel Variant-Cohasset complex, 2 to 30 percent slopes	734	0.1
KIE5	Kinkel Variant-Cohasset complex, 2 to 30 percent slopes, altered	367	*
KIF	Kinkel Variant-Cohasset complex, 30 to 50 percent slopes	332	*
KJF	Kinkel Variant-Rock outcrop complex, 2 to 40 percent slopes	525	*
KME	Kyburz-Aldi complex, 2 to 30 percent slopes	9,913	0.8
KME5	Kyburz-Aldi complex, 2 to 30 percent slopes, altered	425	*
KMF	Kyburz-Aldi complex, 30 to 50 percent slopes	8,788	0.7
KMF2	Kyburz-Aldi complex, 30 to 50 percent slopes, eroded	1,715	0.1
KPC	Aldi-Aquolls-Kyburz complex, 2 to 9 percent slopes	1,809	0.1
KRE	Kyburz-Rock outcrop-Trojan complex, 2 to 30 percent slopes	4,501	0.4
KRF	Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes	4,610	0.4
KRF2	Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes, eroded	416	*
KRG	Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes	17,091	1.4
KRG2	Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes, eroded	977	0.1
KVE	Kyburz-Trojan-Aquolls complex, 2 to 30 percent slopes	253	*
LCE	Ledford-Ledford Variant complex, 2 to 30 percent slopes	317	*
LCF	Ledford-Ledford Variant complex, 30 to 50 percent slopes	1,076	0.1
LDE	Ledford-Ledford Variant-cryumbrepts, wet complex, 2 to 30 percent slopes	382	*
LDF	Ledford-Ledford Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes	2,384	0.2
LOE	Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes	2,766	0.2
LOF	Lorack-Smokey-Cryumbrepts, wet complex 30 to 50 percent slopes	1,299	0.1
MAE	Mariposa-Jocal complex, 2 to 30 percent slopes	5,443	0.4
MAE5	Mariposa-Jocal complex, 2 to 30 percent slopes, altered	699	0.1

	Map Unit Name	Acres	Percent
MAG	Mariposa-Jocal complex, 30 to 75 percent slopes	20,427	1.6
MCE	McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes	18,201	1.5
MCE5	McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes, altered	5,899	0.5
MCG	McCarthy-Ledmount-Crozier complex, 30 to 75 percent slopes	22,702	1.8
MCG6	McCarthy-Ledmount-Crozier complex, 30 to 60 percent slopes, terraced	302	*
MEB	Martis-Euer Variant complex, 2 to 5 percent slopes	5,988	0.5
MHG	Meiss-Gullied land-Rock outcrop complex, 30 to 75 percent slopes	7,951	0.6
MIE	Melee-Rock outcrop complex, 2 to 30 percent slopes	2,280	0.2
MIG	Melee-Rock outcrop complex, 30 to 75 percent slopes	7,505	0.6
MIG3	Melee-Rock outcrop complex, 30 to 75 percent slopes, severely eroded	9,348	0.8
MKE	Meiss-Waca complex, 2 to 30 percent slopes	6,122	0.5
MKF	Meiss-Waca complex, 30 to 50 percent slopes	14,731	1.2
MKF3	Meiss-Waca-Rock outcrop complex, 30 to 50 percent slopes, severely eroded	5,452	0.4
MLE	Meiss-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes	4,957	0.4
MLG	Meiss-Waca-Cryumbrepts, wet complex, 30 to 75 percent slopes	8,496	0.7
MMG	Rock outcrop, metamorphic-Putt-Deadwood complex, 30 to 75 percent slopes	3,594	0.3
MMH	Rock outcrop, metamorphic-Rubble land-Gullied land complex	9,046	0.7
MMRE	Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes	3,480	0.3
MMRG	Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes	14,508	1.2
MNG	Rock outcrop, metamorphic-Woodesye complex, 30 to 75 percent slopes	16,962	1.4
MOE	Franktown-Aldi-Rock outcrop complex, 2 to 30 percent slopes	2,612	0.2
MOG	Franktown-Aldi-Rock outcrop complex, 30 to 75 percent slopes	15,415	1.2
MPC	Fugawee Variant-Aquolls-Fugawee complex, 2 to 9 percent slopes	79	*
MRE	Fugawee Variant-Fugawee complex, 2 to 30 percent slopes	1,762	0.1
MRG	Fugawee Variant-Fugawee-Rock outcrop complex, 30 to 75 percent slopes	1,467	0.1
MUE	Tahoma Variant-Hotaw Variant-Cryumbrepts , wet complex, 2 to 30 percent slopes	3,267	0.3
MUF	Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes	1,363	0.1
PBE	Portola gravelly fine sandy loam, 2 to 30 percent slopes	2,424	0.2
PBF	Portola gravelly fine sandy loam, 30 to 50 percent slopes	2,102	0.2
PCG	Portola-Rock outcrop complex, 30 to 75 percent slopes	1,775	0.1
PME	Putt-McCarthy-Zeibright complex, 2 to 30 percent slopes	615	*
PMG	Putt-McCarthy-Zeibright complex, 30 to 75 percent slopes	892	0.1
PTE	Putt-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes	3,316	0.3
PTG	Putt-Rock outcrop-Cryumbrepts, wet complex, 30 to 75 percent slopes	426	*
PUE	Putt-Zeibright complex, 2 to 30 percent slopes	3,133	0.3
PUF	Putt-Zeibright complex, 30 to 50 percent slopes	2,340	0.2
PVE	Putt-Rock outcrop, granitic-Zeibright complex, 2 to 30 percent slopes	1,447	0.1
PVG	Putt-Rock outcrop, granitic-Zeibright complex, 30 to 75 percent slopes	3,187	0.3
PWE	Putt-Rock outcrop, metamorphic-Zeibright complex, 2 to 30 percent slopes	1,274	0.1
PWG	Putt-Rock outcrop, metamorphic-Zeibright complex, 30 to 75 percent slopes	1,343	0.1
PX	Pits, borrow	10,682	0.9

	Map Unit Name	Acres	Percent
R	Riverwash	3,167	0.3
RAG	Rock outcrop-Franktown-Kyburz complex, 50 to 75 percent slopes	4,957	0.4
RCG	Rock outcrop-Chawanakee-Chaix complex, 50 to 75 percent slopes	1,046	0.1
RDE	Rock outcrop-Dubakella-Dubakella variant complex, 2 to 40 percent slopes	872	0.1
RDG	Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes	6,949	0.6
RPE	Rock outcrop, granitic-Putt complex, 2 to 30 percent slopes	977	0.1
RPG	Rock outcrop, granitic-Putt complex, 30 to 75 percent slopes	6,702	0.5
RRG	Rock outcrop, granitic-Tinker complex , 30 to 75 percent slopes	6,751	0.5
RSE	Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes	9,234	0.7
RSG	Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes	11,648	0.9
RTG	Rock outcrop-Toiyabe complex, 50 to 75 percent slopes	3,480	0.3
RUG	Rock outcrop-Woodseye Variant-Umpa complex , 30 to 75 percent slopes	1,249	0.1
RVE	Rock outcrop-Waca rhyolitic substratum-Ledmount Variant complex, 2 to 30 percent slopes	436	*
RWG	Rock outcrop-Waca-Meiss association, 50 to 75 percent slopes	917	0.1
SIE	Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes	2,325	0.2
SKE	Sites-Jocal complex, 2 to 30 percent slopes	5,036	0.4
SKE5	Sites-Jocal complex, 2 to3O percent slopes, altered	297	*
SKF	Sites-Jocal-Mariposa complex, 30 to 50 percent slopes	1,998	0.2
SME	Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes	6,037	0.5
SMG	Smokey-Woodseye-Rock Outcrop complex, 30 to 75 percent slopes	17,993	1.4
SOE	Smokey-Lorack-Cryumbrepts, wet complex, 2 to 30 percent slopes	5,363	0.4
SOF	Smokey-Lorack-Cryumbrepts, wet complex, 30 to 50 percent slopes	3,946	0.3
SPG	Smokey-Rock outcrop, metamorphic-Rubble land complex, 30 to 75 percent slopes	932	0.1
STE	Rubble land-Jorge complex, 2 to 30 percent slopes	734	0.1
STG	Rubble land-Jorge complex, 30 to 75 percent slopes	2,617	0.2
SUG	Rubble land-Rock outcrop complex	5,447	0.4
TAE	Tallac very gravelly sandy loam, 2 to 30 percent slopes	6,573	0.5
TAF	Tallac very gravelly sandy loam, 30 to 50 percent slopes	2,746	0.2
TBE	Tallac-Cryumbrepts wet complex, 2 to 30 percent slopes	28,055	2.3
TBF	Tallac-Cryumbrepts wet complex, 30 to 50 percent slopes	5,621	0.5
THF	Tallac-Gullied land-Cryumbrepts, wet complex, 30 to 60 percent slopes	1,200	0.1
TIE	Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes	12,704	1.0
TIG	Tinker-Rock outcrop, granitic-Cryumbrepts wet complex, 30 to 75 percent slopes	9,120	0.7
TPG3	Toiyabe-Rock outcrop-Haypress complex, 30 to 75 percent slopes, severely eroded	858	0.1
TTE	Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes	3,589	0.3
TTF	Trojan-Sattley-Kyburz complex, 30 to 50 percent slopes	4,030	0.3
TUE	Trojan-Sattley-Cryumbrepts, wet complex 2 to 30 percent slopes	491	*
TWE	Rouen-Variant-Aspen Variant-Sierraville complex, 2 to 30 percent slopes	1,447	0.1
TWF	Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes	2,032	0.2
TWF6	Rouen Variant-Aspen Variant-Sierraville complex 20 to 50 percent slopes, terraced	1,581	0.1
TXE	Rouen Variant-Cryumbrepts, wet-Aspen Variant complex, 2 to 30 percent slopes	724	0.1

	Map Unit Name	Acres	Percent
ULC	Kyburz loam, 2 to 9 percent slopes	768	0.1
UME	Umpa stony sandy loam, 2 to 30 percent slopes	3,569	0.3
UMF	Umpa stony sandy loam, 30 to 50 percent slopes	4,045	0.3
UNE	Umpa-Cryumbrepts wet complex, 2 to 30 percent slopes	704	0.1
UOE	Umpa-Rock outcrop complex, 2 to 30 percent slopes	1,175	0.1
UOG	Umpa-Rock outcrop complex, 30 to 75 percent slopes	2,122	0.2
VRG	Rock outcrop, volcanic	3,286	0.3
W	Water	19,728	1.6
WAE	Waca-Windy complex, 2 to 30 percent slopes	20,893	1.7
WAF	Waca-Windy complex, 30 to 50 percent slopes	18,682	1.5
WBE	Waca-Cryumbrepts, wet-Windy complex, 2 to 30 percent slopes	5,482	0.4
WBF	Waca-Cryumbrepts, wet-Windy complex, 30 to 50 percent slopes	6,310	0.5
WCF	Waca-Gullied land-Cryumbrepts, wet complex, 30 to 50 percent slopes	3,737	0.3
WDE	Waca-Meiss complex 2 to 30 percent slopes	16,853	1.4
WDF	Waca-Meiss complex 30 to 50 percent slopes	25,839	2.1
WEE	Waca-Meiss-Cryumbrepts, wet complex 2 to 30 percent slopes	9,339	0.8
WEF	Waca-Meiss-Cryumbrepts, wet complex 30 to 50 percent slopes	12,977	1.0
WOE	Woodseye-Rock outcrop-Smokey complex 2 to 30 percent slopes	1,487	0.1
WOG	Woodseye-Rock outcrop-Smokey complex, 30 to 75 percent slopes	14,443	1.2
WRG	Ledford Variant-Rock outcrop complex, 30 to 75 percent slopes	1,537	0.1
XCE	Kyburz-Aldi Variant-Jorge Variant complex, 2 to 30 percent slopes	1,522	0.1
XCF	Kyburz-Aldi Variant-Jorge Variant complex, 30 to 50 percent slopes	937	0.1
XRE	Tinker-Rock outcrop, metamorphic-Crywubrepts, wet complex 2 to 30 percent slopes	5,532	0.4
XRF	Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex 30 to 50 percent slopes	3,143	0.3
XXE	Jorge Variant-Kyburz complex 2 to 30 percent slopes	2,364	0.2
XXF	Jorge Variant-Kyburz complex 30 to 50 percent slopes	852	0.1
ZEE	Zeibright gravelly fine sandy loam 2 to 30 percent slopes	1,428	0.1
ZEF	Zeibright gravelly fine sandy loam, 30 to 50 percent slopes	1,368	0.1
ZFF	Zeibright-Putt-Cryumbrepts, wet complex, 30 to 60 percent slopes	263	*
	Totals	1,243,000	100

* less than 0.1 percent.

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