United States Department of Agriculture

Forest Service

Pacific Southwest Region

In cooperation with:

U.S.D.A. Soil Conservation Service

Regents of the University of California (Agricultural Experiment Station)

Soil Survey
Klamath National Forest Area California

How To Use This Soil Survey

General Soil Map

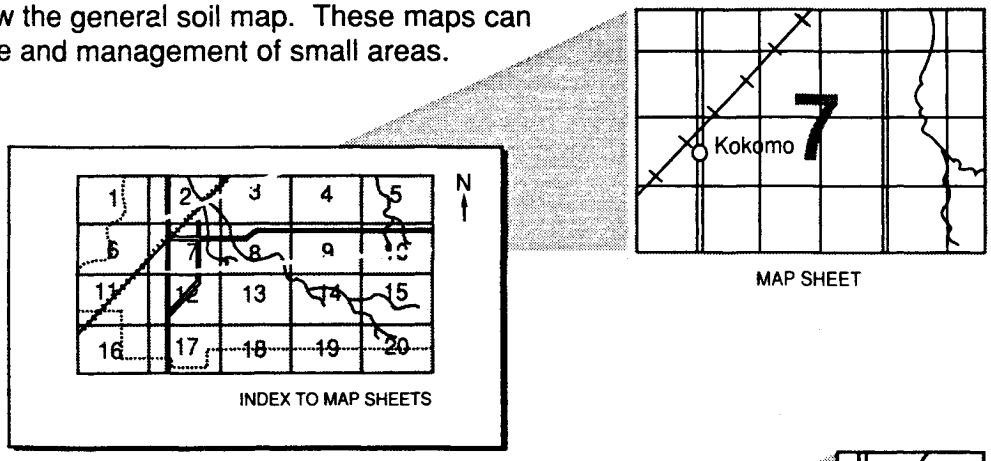
The general soil map, which is the small scale map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

Detailed Soil Maps

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

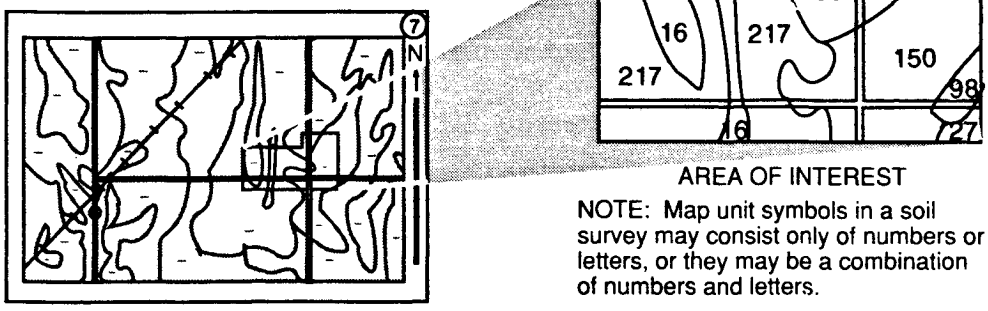
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

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



MAP SHEET

AREA OF INTEREST

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

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

Klamath 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, other federal agencies and state agencies including the Agricultural Experiment Stations. The fieldwork 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 Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status or age.

Major fieldwork for this soil survey was performed in the period 1978-1981. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Forest Service and the Soil Conservation Service. The soil survey area consists of the Klamath National Forest which occurs in Siskiyou County, California and Jackson County, Oregon.

Contents

Taxonomic Units

Index to Map Units

Summary of Tables

Foreward

The Soil Survey of the Klamath National Forest Area, in parts of Siskiyou County, California and Jackson County, Oregon, was designed to facilitate broad forestwide resource management planning and to increase the knowledge of our environment. It contains predictions of soil productivity and behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil.

This soil survey has been prepared primarily for forest resource planners and managers. It is useful for preliminary project planning, for identifying general soil management considerations and for evaluation of more intensive soil survey needs. This survey can be used for detailed resource management planning and project level planning and design only after field verification.

Great differences in soil properties can occur within short distances. Soils may be shallow to bedrock and incapable of producing commercial timber. They may be seasonally wet or subject to flooding. A low available water capacity makes a soil poorly suited to reforestation. A high water table makes a soil suitable for use as summer range.

These and many other soil 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 soil in the survey area is described and information on specific uses is given for each soil.

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

BARBARA HOLDER
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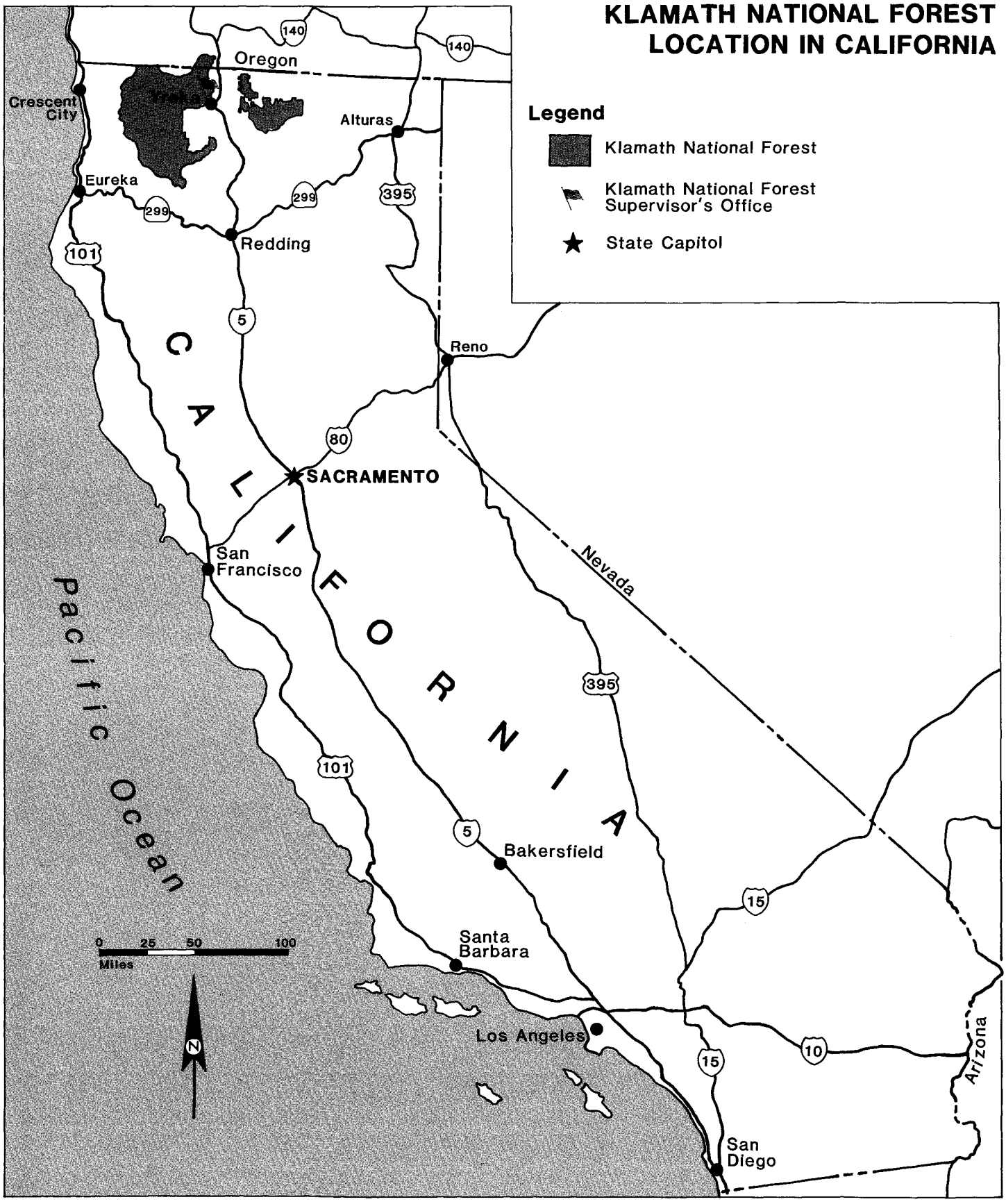
Klamath National Forest


KLAMATH NATIONAL FOREST
LOCATION IN CALIFORNIA
Legend
Klamath National Forest
Klamath National Forest Supervisor's Office
State Capitol
Oregon
Crescent City
Yreka
Alturas
Eureka
Redding
Reno
SACRAMENTO
San Francisco
Bakersfield
Santa Barbara
Los Angeles
San Diego
Nevada
Arizona
CALIFORNIA
Pacific Ocean
140
299
395
101
5
80
15
10
0 25 50 100
Miles
N

Soil Survey of Klamath National Forest Area, California

Parts of Siskiyou County, California and Jackson County, Oregon

By Cynthia M. Foster and Greg K. Lang

Soils surveyed by Earl Alexander, Larry Bryant, Cynthia Foster, Ernest Genter, Robert Graham and Greg Lang, Forest Service

General Nature of the Survey Area

Most of the Klamath National Forest is in survey area 702 in northcentral California. There are also some small parcels of Forest Service land outside of the survey area which were mappped by the Soil Conservation Service in former soil surveys. Survey area 702 is in Siskiyou County California and Jackson County Oregon. The approximate acreage of each County and State in the survey area is:

Siskiyou County, California	1,733,545
Jackson County, Oregon	27,520

The total size of the survey area is 1,761,065 acres. Of the total, about 236,160 acres are privately owned and 560 acres are lake bodies greater than 40 acres in size in Siskiyou County, California. In Jackson County, Oregon, about 3,200 acres are in private ownership. The Forest consists of six Ranger Districts: Goosenest, Happy Camp, Oak Knoll, Salmon River, Scott River and Ukonom. Forest headquarters is in Yreka, California.

Climate

The climate of the Klamath National Forest is mediterranean, with cool moist winters and warm dry summers. Average January temperature on the Forest ranges from about 22 to 44° F., and average July temperature ranges from about 55 to 75° F. (9,19).

Precipitation ranges from about 9 to 40 inches on the Goosenest Ranger District to the east and 80 to over 100 inches on the western most portion of the Happy Camp Ranger District. Roughly 80 percent of the precipitation falls in the six month period from October 1 to April 1. Most of the precipitation is from widespread storms of several days duration and of relatively moderate intensities. Snow occurs in moderate amounts at elevations of 2,000 feet and up, but only above about 4,000 feet does snow remain on the ground for long periods (9,19).

Geomorphology

The survey area covers portions of the Klamath Mountains Physiographic Province in the western portion of the Forest, and the Cascade Range Physiographic Province on the eastern portion of the Forest. The Klamath Mountains portion is typically steep to very steep, highly dissected uplands ranging from 500 to 8,000 feet in elevation. There has been much folding, faulting, shearing and uplifting of the granitic, metamorphic and ultramafic rocks. The Cascade portion is dominated by gently undulating, rolling slopes occasionally broken by steep volcanic cinder cones or fault scarps. Young volcanic lava flows and cinder cones overlay older faulted and tilted volcanic materials. Elevations range from 2,700 to 8,500 feet (3).

Most of the Forest's lakes and streams are located on the west side (west of Interstate Highway 5). Streams of all sizes occur in the deep, steep canyons, with lakes primarily in the high mountains. The Shasta River, Salmon River and Scott River drain into the Klamath River, which drains the entire area and yields approximately 94 percent of the water produced from the Forest.

Four smaller streams occur on the east side of the Forest (east of Interstate Highway 5). The Little Shasta River and Shovel Creek originate on Ball Mountain and flow into the Klamath River. Butte Creek and Antelope

Creek originate in the southwest side of the province and drain into the enclosed Butte Valley basin.

Bedrock within the Cascade Range Province consists of a wide variety of lava flows, mainly basalt and andesite, along with pyroclastic rocks such as tuffs and breccias which are associated with explosive eruptions. The rocks range in age from Eocene to recent. Lakebed deposits including fresh water diatomite occur locally along with alluvial deposits and glacial moraines and outwash (3,6).

The Klamath Mountains Province is divided into four major bedrock units from east to west: the Eastern Klamath Belt, the Central Metamorphic Belt, the Western Paleozoic and Triassic Belt and the Western Jurassic Belt. A wide variety of metamorphic rocks occur within these belts. Schists, marble, quartzite, greenstone (metamorphosed volcanic rock) and chert are common. In many areas, the metamorphic rock has been intruded by large bodies of granitic rock and tabular bodies of ultrabasic rock (peridotite). The peridotite is often altered almost completely to serpentinite. These rock units range in age from the Ordovician to the Jurassic periods. A minor amount of Cretaceous sedimentary rock occurs in the vicinity of Hornbrook. Quaternary deposits consist of glacial morraine and outwash, elevated stream terraces, recent alluvium and landslide deposits (3,6).

Wildlife

A great diversity of wildlife species inhabit the Klamath National Forest. A number of sensitive and endangered species are found here, along with such harvest species as the black-tailed deer, mule deer, black bear, gray fox, raccoon, gray squirrel, jackrabbit and quail. Some species, such as the spotted owl, goshawk and pileated woodpecker depend upon old-growth forest areas for their habitat (15).

Forest Uses

Timber production is the dominant land use on the Forest. Watershed, fisheries and wildlife values are important resources for land use. Recreation, including hunting, fishing, hiking and offroad vehicle use is also important. Range use is of significant extent primarily on the Goosenest Ranger District.

Vegetation

Eight major vegetation types (4) are found on the Klamath National Forest. The following are brief descriptions of each type and the corresponding CALVEG Series designations (18):

YELLOW PINE - SHRUB FOREST [8]. This forest type is dominated by pine forest with bitterbrush. It occurs mainly on the east side of the Forest in the Cascades (CALVEG Ponderosa Pine, Bitterbrush - Rabbitbrush);

KLAMATH MONTANE FOREST WITH DOUGLAS FIR [12]. This forest is dominated by white fir and red fir, with Douglas-fir, incense cedar, mountain hemlock and ponderosa pine. It occurs mainly on the far west side of the Forest in the Klamath Mountains. (CALVEG Douglas Fir - Tanoak - Madrone; Douglas-Fir - Pine - Madrone; Mixed Conifer - Fir);

KLAMATH MONTANE FOREST WITH YELLOW PINE [13]. This forest type is dominated by Douglas fir, with ponderosa pine, sugar pine, white fir and incense cedar. It occurs mainly on the west side of the Forest in the Klamath Mountains (CALVEG Mixed Conifer - Pine; Jeffrey Pine);

SIERRA MONTANE FOREST [15]. This forest type is dominated by white fir and pine timber. It occurs mainly on the east side of the Forest in the Cascade Mountains (CALVEG Mixed Conifer - Fir; Mixed Conifer - Pine; White Fir; Canyon Live Oak; Black Oak);

UPPER MONTANE - SUBALPINE FOREST [17]. This forest type is dominated by red fir and pine. It occurs at higher elevations on the east side of the Forest in the Cascade Mountains (CALVEG Lodgepole Pine; Mountain Hemlock);

OREGON OAK FOREST [20]. This forest type is dominated by oak and other hardwoods with brush understory. The minor amount of chaparral on the Forest is included in this type. It occurs mainly on the east side of the Klamath Mountains (CALVEG Oregon White Oak);

MIXED EVERGREEN FOREST WITH CHINQUAPIN [21]. This forest type is dominated by dense evergreen forest composed of madrone, Douglas-fir, canyon live oak and chinquapin. It occurs primarily on the west side of the Forest in the Klamath Mountains (CALVEG Douglas-fir - Pine - Madrone; Douglas-fir; Tanoak - Madrone; Canyon live oak; Oregon white oak; Madrone - Black oak; Bush chinquapin);

SAGEBRUSH STEP [31]. This shrub type is dominated by sagebrush and rabbitbrush with some juniper. It occurs mainly on the east side of the Forest in the Cascades (CALVEG Bitterbrush - Rabbitbrush).

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* (12), the *National Soils Handbook* (14), and the soil classification system as stated in *Soil Taxonomy* (13).

Soil Scientists begin the inventory by collecting, studying and correlating all the existing data and information concerning the survey area (Klamath National Forest) that is related to soil genesis and morphology. This includes lithological, geomorphological, topographical, elevational, climatic, vegatative 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 begining 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 were 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 vegatative 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 in hand, the soil scientist examined on the ground as many delineations of each map unit as was feasibly 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 to one-half 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 not suitable for project planning without field verification.*

As each map unit was visited and examined, individual soils were 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 particular portion of the landscape which 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 not suitable for project planning without field verification.*

This field examination and study, with 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 alloted to this inventory. By classifying the soils, the soil scientist can also, with acceptable reliability, bring information concerning 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 alloted for the completion of this survey, these use and management interpretations and predictions should be 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 not suitable 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 Soil Map Units

The general soil map shows map units which consist of many individual soils. Each map unit contains soils with similar parent rock material and similar soil temperature regimes. 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 family 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 spring-summer range 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.

Explanation of the General Soil Map Units

All map units used were geater than 6,000 acres in extent. Component map units (M.U.'s) are listed in order of dominance.

TABLE 2. - Map Unit Descriptions and Management Interpretations

Unit	Classification	% Composition	Family
	Young Soils Formed From Pyroclastic Material		
1	Dystric Xerorthents, ashy-skeletal, frigid	45	Avis
	Dystric Xeropsamments, ashy, frigid	40	Oosen
	Andic Xerumbrepts, Ultic Haploxeralfs, Rock outcrop	15	
	M.U.'s: 103, 169		
2	Typic Xerorthents, loamy-skeletal, mixed, nonacid, frigid, pumice overburden phase	55	Belzar, Pumice Overburden
	Ultic Haploxeralfs, fine-loamy, mixed, frigid, pumice overburden phase	25	Wintoner, Pumice Overburden
	Dystric Xerorthents, Ultic Haploxeralfs, Rock outcrop	20	
	M.U.'s: 104, 105, 173		
	Residual Soils Formed From Volcanic Flow Material		
1	Aridic Argixerolls, clayey-skeletal, montmorillonitic, mesic	55	Ruclick
	Lithic Argixerolls, clayey, montmorillonitic, mesic	20	Deven
	Aridic Argixerolls, fine-loamy, mixed, mesic	15	Cowiche
	Rock outcrop, Typic Argixerolls, Cumulic Haploxerolls	10	
	M.U.'s: 177, 178, 179, 195		

Unit	Classification	% Composition	Family
2	Mollic Haploxeralfs, fine-loamy, mixed, frigid	30	Neuske
	Ultic Argixerolls, fine-loamy, mixed, frigid	25	Trojan
	Mollic Haploxeralfs, loamy-skeletal, mixed, frigid	20	Etchen
	Pachic Argixerolls, Ultic Haploxerolls, Durixeralfs	25	
	M.U.'s: 126, 167, 192, 194		
3	Ultic Haploxeralfs, loamy-skeletal, mixed, frigid	65	Inville
	Ultic Haploxeralfs, fine-loamy, mixed, frigid	20	Wintoner
	Dystric Xerochrepts, Mollic Haploxeralfs, Rock outcrop	15	
	M.U.'s: 145, 146		
4	Pachic Ultic Argixerolls, fine-loamy, mixed, frigid	40	De Masters
	Pachic Ultic Argixerolls, loamy-skeletal, mixed, frigid	35	Smarts
	Typic Argixerolls, Rock outcrop, meadows	25	
	M.U.'s: 121		
	Residual Soils With Pyrolastic Influence		
	Andic Xerumbrepts, medial-skeletal, frigid	45	Sheld
	Andic Xerumbrepts, medial over loamy-skeletal, mixed, frigid	30	Iller
	Dystric Xerochrepts, loamy-skeletal, mixed, frigid	10	Jayar
	Lava flows, Rock outcrop, Typic Argixerolls, Pachic Argixerolls, Ultic Haploxeralfs	15	
	M.U.'s: 148, 180		
	Wetlands		
	Cumulic Haplaquolls, fine-silty, mixed, frigid	80	Quam
	Typic Argixerolls, Pachic Argixerolls	20	
	M.U.'s: 172		
	Residual Soils Formed From Coarse-Grained Igneous Rocks		
1	Dystric Xerochrepts, coarse-loamy, mixed, mesic	60	Gilligan
	Dystric Xerochrepts, loamy, mixed, mesic, shallow	15	Chawanakee
	Ultic Haploxeralfs, fine-loamy, mixed, mesic	15	Holland
	Typic Haploxerults, Typic Xerumbrepts, Entic Xerumbrepts	10	
	M.U.'s: 128, 129, 130, 142, 170		

Unit	Classification	% Composition	Family
2	Entic Xerumbrepts	40	
	Typic Xerumbrepts, coarse-loamy, mixed, frigid	40	Gerle
	Lithic Xerumbrepts	10	
	Pachic Xerumbrepts, Rock outcrop	10	
	M.U.'s: 124, 125, 127, 162, 165, 166		
3	Lithic Cryumbrepts, loamy-skeletal, mixed	40	Teewinot
	Dystric Cryochrepts, loamy-skeletal, mixed	30	Endlich
	Rock outcrop	10	
	Typic Cryochrepts, Lithic Cryoborolls, Typic Cryumbrepts	20	
	M.U.'s: 117, 123, 175, 189, 190		
	Residual Soils Formed From Metamorphic Rocks		
1	Dystric Xerochrepts, loamy-skeletal, mixed, mesic	40	Clallam
	Dystric Lithic Xerochrepts, loamy-skeletal, mixed, mesic	20	Deadwood
	Ultic Haploxeralfs, fine-loamy, mixed, mesic	15	Holland
	Ultic Haploxeralfs, loamy-skeletal, mixed, mesic, Typic Haploxerults, Lithic Xerumbrepts, Haploxeralfs, Lithic Argixerolls, Ultic Argixerolls	25	Skalan
	M.U.'s: 106, 109, 110, 112, 113, 114, 118, 119, 131, 132, 141, 144, 153, 182, 184, 185		
2	Lithic Xerumbrepts, loamy-skeletal, mixed, frigid	40	Woodseye
	Dystric Xerochrepts, loamy-skeletal, mixed, frigid	35	Jayar
	Typic Xerumbrepts, loamy-skeletal, mixed, frigid	20	Nanny
	Ultic Haploxeralfs, Rock outcrop	5	
	M.U.'s: 147, 150, 165, 166, 197, 198		
3	Ultic Haploxeralfs, loamy-skeletal, mixed, mesic	35	Skalan
	Ultic Haploxeralfs, fine-loamy, mixed, mesic	25	Holland
	Pachic Xerumbrepts, loamy-skeletal, mixed, mesic	15	Tallac
	Dystric Xerochrepts, Typic Xerumbrepts	25	
	M.U.'s: 143, 183, 187		

Unit	Classification	% Composition	Family
	Residual Soil Formed From Ultramafic and Serpentinitic Rocks		
1	Lithic Ruptic-Xerochreptic Haploxeralfs	40	
	Typic Xerochrepts, loamy-skeletal, mixed, mesic	20	Olete
	Mollic Haploxeralfs, clayey-skeletal, serpentinitic, mesic	15	Dubakella
	Pachic Argixerolls, Lithic Mollic Haploxeralfs, Lithic Argixerolls, Typic Xerochrepts, Typic Haploxeralfs, Rock outcrop	25	
	M.U.'s: 101, 122, 134, 140, 151, 155, 157, 161 168, 196		
2	Mollic Palexeralfs, clayey-skeletal, serpentinitic, frigid	50	Tangle
	Mollic Haploxeralfs, loamy-skeletal, mixed, frigid	20	Etchen
	Typic Haploxeralfs, loamy-skeletal, serpentinitic, frigid	15	Toadlake
	Lithic Argixerolls, Typic Haploxeralfs, Typic Xerochrepts, Rock outcrop, Lithic Xerorthents	15	
	M.U.'s: 158, 159, 171, 188, 191, 199		

Soil Descriptions and Broad Land Use Capability

Young Soils Formed From Pyroclastic Material

Description of 1

Well drained and somewhat excessively drained, gently sloping to steep soils on volcanic mountainsides and flats.

The families in this group make up about 4 percent of the survey area. They are on mountains and upland flats throughout the area. The soils are well drained and somewhat excessively drained sands to sandy loams that formed in material weathered from basaltic and andesitic rocks.

Elevations range from 4,500 to 7,000 feet. The average annual precipitation is 20 to 40 inches and the mean annual temperature is 36 to 46°F. The frost-free season is 50 to 100 days.

These families are used mostly for timber production and wildlife habitat.

Description of 2

Well drained and somewhat excessively drained, gently sloping to steep soils on volcanic uplands.

The families in this group make up about 3 percent of the survey area. They are on flats and slopes in large bodies on volcanic uplands. The soils are well drained and somewhat excessively drained sandy loams that formed in materials weathered from extrusive igneous rocks (cinders, basalt, and/or andesite) overlaid by young pumice and ash deposits.

Elevations range from 5,000 to 7,000 feet. The average annual precipitation is 20 to 40 inches and the mean annual temperature is 36 to 44°F. The frost-free season is 50 to 100 days.

These families are used mainly for timber production and wildlife habitat.

Residual Soils Formed From Volcanic Flow Material

These soils are listed in sequence from low precipitation and least productive to high precipitation and most productive for timber.

Description of 1

Well drained, nearly level to moderately steep soils on lava flows and volcanic uplands.

The families in this group make up about 3 percent of the survey area. They are on mountain sideslopes and lava flows on volcanic upland terraces throughout the area. The soils are well drained, loamy sands to silty loams that formed in material weathered from andesitic and basaltic rocks.

Elevations range from 4,200 to 5,800 feet. The mean annual precipitation is 9 to 12 inches and the mean annual temperature is 47 to 56°F. The frost-free season is 50 to 100 days.

These families are used mainly as rangeland and wildlife habitat, with some limited timber production in smaller areas.

Description of 2

Well drained, gently sloping to steep soils on volcanic uplands and terraces.

The families in this group make up about 5 percent of the survey area. They are on mountain footslopes, upland terraces and glacial outwash deposits throughout the area. The soils are well drained loams that formed in material weathered form residual, alluvial or glacial outwash deposits of andesite and basalt.

Elevations range from 4,300 to 5,600 feet. The mean annual precipitation is 15 to 30 inches and the mean annual temperature is 47 to 52°F. The frost-free season is 50 to 100 days.

These families are used mainly for woodland timber production and rangeland. Other uses include wildlife habitat and recreation.

Description of 3

Well drained, gently sloping to steep soils on uplands.

The families in this group make up 4 percent of the survey area. They are on uplands throughout the area. The soils are well drained loams that formed in material weathered form metamorphic and igneous rocks.

Elevations range from 4,600 to 6,800 feet. The average annual precipitation is 20 to 60 inches and the mean

annual temperature is 37 to 46°F. The frost-free season is 50 to 150 days.

These families are used primarily for timber production, wildlife habitat and watershed.

Description of 4

Well drained strongly sloping to steep soils on volcanic uplands.

The families in this group make up about 1 percent of the survey area. They are on volcanic mountain sideslopes, uplands and lava flows throughout the area. The soils are well drained loams that formed in materials weathered from extrusive igneous rocks.

Elevations range from 4,500 to 7,000 feet. The mean annual precipitation is 20 to 40 inches and the mean annual temperature is 37 to 46°F. The frost-free season is 50 to 100 days.

These families are used mainly for timber production. Other uses include wildlife habitat and rangeland.

Residual Soils With Pyroclastic Influence

Well drained, moderately sloping to very steep soils on uplands.

The families in this group make up about 6 percent of the survey area. They are on mountain sideslopes throughout the area. The soils are well drained loams to sandy loams that formed in material weathered from tuff, tuff breccia or other extrusive igneous rocks.

Elevations range from 5,000 to 8,500 feet. The mean annual precipitation is 20 to 45 inches and the mean annual temperature is 37 to 45°F. The frost-free season is 50 to 100 days.

These families are used mainly for timber production, wildlife habitat and watershed.

Wetlands

Somewhat poorly drained and poorly drained, nearly level to strongly sloping soils in basins.

The families in this group makes up about 1 percent of the survey area. They occupy basin, basin terrace, low terrace and fan positions throughout the area. The soils are somewhat poorly drained and poorly drained loams that formed in alluvium.

Elevations range form 4,500 to 5,500 feet. The average annual precipitation is 20 to 40 inches and the average annual temperature is 41 to 46°F. The frost-free season is 50 to 150 days.

These families are used mainly for grazing during summer months.

Residual Soils Formed From Coarse-Grained Igneous Rocks

Description of 1

Well drained and somewhat excessively drained, moderately steep soils on uplands.

The families in this group make up about 10 percent of the survey area. They are on mountain sideslopes, footslopes and ridges throughout the area. The soils are well drained and somwhat excessively drained loamy sands to loams that formed in material weathered from granitic rocks.

Elevations range from 1,500 to 5,000 feet. The mean annual precipitation is 35 to 60 inches and the mean annual temperature is 45 to 57°F. The frost-free season is 125 to 200 days.

These families are used primarily for timber production, watershed, wildlife habitat and range.

Description of 2

Well drained and somewhat excessively drained, moderately steep to extremely steep soils on uplands.

The families in this group make up about 8 percent of the survey area. They are on mountain sideslopes throughout the area. The soils are well drained and somewhat excessively drained sandy loams that formed in material weathered from granitic rocks.

Elevations range from 4,800 to 6,800 feet. The mean annual precipitation is 50 to 75 inches and the mean annual temperature is 37 to 45°F. The frost-free season is 100 to 175 days.

These families are used mainly for timber production, watershed and wildlife habitat.

Description of 3

Well drained and somewhat excessively drained, steep to extremely steep soils on uplands.

The families in this group make up about 5 percent of the survey area. They are on mountain sideslopes, ridges and cirque headwalls throughout the area. The soils are well drained and somewhat excessively drained loams to sandy loams that formed in materials weathered from granitic, serpentinitic and metamorphic rocks.

Elevations are 6,500 to 8,000 feet. The mean annual precipitation is 60 to 80+ inches and the mean annual temperature is 35 to 40°F. The frost-free season is less than 90 days.

These families are used mainly for watershed, wildlife and rangeland.

Residual Soils Formed From Metamorphic Rocks

Description of 1

Well drained and somewhat excessively drained, strongly sloping to extremely steep soils on uplands.

The families in this group make up about 25 percent of the survey area. They are on mountain sideslopes, colluvial footslopes and narrow ridges throughout the area. The soils are well drained and somewhat excessively drained loams that formed in materials weathered from metamorphic rocks.

Elevations range from 1,200 to 5,200 feet. The mean annual precipitation is 45 to 90 inches and the mean annual temperature is 45 to 55°F. The frost-free season is 100 to 200 days.

These families are used mainly for timber production. Other uses include watershed, wildlife and rangeland.

Description of 2

Well drained and somewhat excessively drained, gently sloping to extremely steep soils on uplands and high terraces.

The families in this group make up about 12 percent of the survey area. They are on mountain sideslopes, colluvial footslopes and moraines throughout the area. The soils are well drained and somewhat excessively drained loamy sands to loams that formed in materials weathered from metamorphic rocks.

Elevations range from 4,800 to 7,000 feet. The mean annual precipitation is 50 to 100 inches and the mean annual temperature is 37 to 46°F. The frost-free season is 100 to 150 days.

These families are used mainly for watershed, wildlife habitat and rangeland. Other uses include commercial timber production.

Description of 3

Well drained moderately steep to very steep soils on uplands.

The families in this group make up about 5 percent of the survey area. They are on broad mountain sideslopes, ridges and landslide benches throughout the area. The soils are well drained sandy loams to loams that formed in materials weathered from metamorphic rocks.

Elevations range from 1,500 to 7,000 feet. The mean annual precipitation is 30 to 70 inches and the mean annual temperature is 38 to 55°F. The frost-free season is 100 to 200 days.

These families are used mainly for timber production. Other uses include rangeland, wildlife habitat and watershed.

Residual Soils Formed From Ultramafic and Serpentinitic Rocks

Description of 1

Well drained strongly sloping to extremely steep soils on uplands.

The families in this group make up about 5 percent of the survey area. They are on mountain sideslopes and colluvial footslopes throughout the area. The soils are well drained loams to silt loams that formed in materials weathered from ultramafic and serpentinitic rocks.

Elevations range from 500 to 5,000 feet. The mean annual precipitation is 30 to 80 inches and the mean annual temperature is 47 to 60°F. The frost-free season is 125 to 200 days.

These families are used mainly for watershed, wildlife habitat and rangeland.

Description of 2

Well drained and somewhat excessively drained moderately steep to extremely steep soils on uplands.

The families in this group make up about 3 percent of the survey area. They are on mountain sideslopes, colluvial footslopes and landslide benches throughout the area. The soils are well drained and somewhat excessively drained sandy loams to sandy clay loams that formed

in materials weathered from ultramafic and serpentinitic rocks.

Elevations range from 4,200 to 6,800 feet. The mean annual precipitation is 30 to 60 inches and the mean annual temperature is 37 to 45°F. The frost-free season is 100 to 175 days.

These families are used mainly for wildlife habitat and watershed. Other uses include timber production and rangeland.

Detailed Soil Map Units

Definitions and Criteria

The map units on the soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, 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.

A symbol identifying the soil 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.

Soils that have similar profiles make up a family. Except for relatively minor variations, all of the soils of one family have major horizons that are similar in such important characteristics as texture, thickness and arrangement. Each family is given the name of the soil series that has been designated as representative for that family. Hades and Holland families are the names of two soil families mapped in the survey area. This does not mean that these soil series were mapped here, but rather the taxonomic families of which those series are members. The Hades series, for example, is a member of the fine-loamy, mixed, frigid family of Pachic Argixerolls. All the soils in the United States that have the same family names may differ in slope, stoniness, depth or some other characteristic affecting land use. On the basis of such differences, a soil family is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Clallam family, very deep, is a phase within the Clallam family.

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

A 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. Inville - Wintoner families complex, 2 to 15 percent slopes, is an example.

A 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. Vipont - Hades families association, 15 to 50 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. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps.

The soil legend at the back of this report gives the acreage and proportionate extent of each map unit. Table 1 lists the map units in which each soil occurs as a primary component or as an inclusion. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

TABLE 1. - Soil Components in Map Units

Component Name	Named Primary Component	Named Inclusion
Aiken	101, 102, 139, 140	
Avis	103, 169	
Beaughton	151	
Belzar	104, 105	
Bluesprin	106, 154	153, 185
Buell	107, 123	
Chawanakee	128	119
Cinder Lands	108	
Clallam, deep	109, 111, 112, 113, 114 118, 132, 140, 141, 182, 183	106, 119, 131, 138, 143 144, 153, 154, 184
Clallam, very deep	110, 111, 115	
Coboc	116, 141	113, 114, 137, 143, 144
Cowiche	177	
Deadfall	117	
Deadwood	112, 118, 119	106, 109, 113, 114, 132, 140, 141, 143, 144, 153, 182, 183, 184, 185
Decy	183	143
Deetz	120	
De Masters	121	
Deven	178, 179	
Dubakella	122, 155	109
Dumps	102	
Endlich	123, 189	175, 190
Entic Xerumbrepts	124, 125, 127	162
Etchen	126, 167	
Gerle	124, 125, 127	
Gilligan	128, 129, 130, 133, 142	119
Goldridge	129, 133	109, 110, 112, 113
Goldridge, gravelly	114, 131, 132	
Guemes	134	109, 110, 131, 138, 140, 151, 157, 161, 168, 196
Hades	194	
Haplic Durixeralfs	135, 136	192
Helvetia	137	
Holland	113, 116, 130, 138, 139, 140, 141, 142, 143, 144, 153	110, 112, 136, 137, 183, 185

Component Name	Named Primary Component	Named Inclusion
Iller	180	
Inville	145, 146, 147	149, 156
Jayar	148, 149, 150, 176, 198	156, 170, 197
Kang	151	
Kilmerque	192	
Lava Flows	153, 181	
Lithic Argixerolls	191	188, 194, 195, 199
Lithic Cryoborolls	117	
Lithic Haploxeralfs	153, 184, 196	144, 151
Lithic Haploxerolls	193	
Lithic Mollic Haploxeralfs	106, 149, 154, 155, 156, 185	134, 184
Lithic Ruptic-Xeroch-reptic Haploxeralfs	157, 158, 168, 171	159
Lithic Xerorthents	159, 160, 161	128, 130, 155, 158, 171
Lithic Xerumbrepts	162	119, 124, 125, 127, 170, 176
Merkel	163	
Mollic Haploxeralfs	199	101, 140, 151
Mollic Palexeralfs	199	
Morical	136, 164	
Nanny	165, 166, 186	187
Neuske	126, 167	
Olete	157, 168	101, 110, 122, 131, 134, 138, 155
Oosen	103, 169	
Ovall	170	
Parks	158, 171	159
Prather	132	114
Quam	172	
Redcap	173	104, 105
Riverwash	115, 174	
Rock Outcrop	119, 156, 159 160, 162, 175 190, 197	101,102,103,106,107,108, 109,112,113,114,117,118, 120,121,122,123,124, 125,126,127,128,129,130, 132,133,134,141,142,144, 145,146,148,149,150,151, 153,154,155,157,158, 161,165,166,168, 170,171,173,176,177,178, 179,180,182,183,184,186, 187,188,189,191,193, 194,195,196,198,

Component Name	Named Primary Component	Named Inclusion
Rogue	176	148, 156, 170, 197
Ruclick	177, 178, 179	
Sheld	180, 181	
Skalan	143, 144, 182, 183, 184, 185	109, 110, 118
Smarts	121	
Stonewell	173	
Tallac	125, 186, 187	127, 147, 198
Tangle	188	
Teewinot	175, 189, 190	123
Toadlake	191	159, 188
Trojan	192	
Typic Haploxerolls	193	
Ultic Haploxeralfs	187	
Vipont	194	
Washoe	195	
Weitchpec	196	101, 110, 122, 131, 134, 138, 155
Wintoner	146, 147	149, 156
Wintoner, pumice overburden	104, 105	
Woodseye	150, 197, 198	147, 149
Worley	164	
Zeibright	170	

Management Interpretations: Definitions and Criteria

Each soil mapping unit is described in the following tables, along with characteristics of the associated individual soils that can be interpreted for management purposes. The mapping unit descriptions contain the composition of the units by designation of the major components, inclusions and their proportions, and also lists some of the landscape features and typical vegetative cover of the major components.

Interpretations important for management are listed for the components of each mapping unit. An explanation of the ratings are given in the tables which follow.

Available Water Capacity (AWC)

The available water capacity is the capacity of a soil to store water for use by plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is expressed as inches of available water per inch of soil, and is directly related to soil texture.

Below is a list of the AWC's of the textural classes:

Textural Class	Probable range on basis of texture[1]
Very fine-fine (clay, silty clay, sandy clay)	.12 - .17
Moderately fine (clay loam, silty clay loam, sandy clay loam)	.17 - .19
Medium (loam, silt loam, silt, very fine sandy loam)	.12 - .17
Moderately coarse (fine sandy loam, sandy loam, loamy very fine sand, loamy fine sand)	.08 - .12
Coarse (loamy sand, loamy coarse sand, fine sand, sand)	.06 - .08
Very coarse (coarse sand, gravel)	.03 - .06

[1] These figures represent the probable ranges for each textural class based only on texture. Where gravel or other rock fragments are present, values for textures shown above are reduced by the percent gravel or rock fragments present. These figures may also be slightly altered by structure and organic matter content.

Infiltration

Infiltration is the rate at which water enters into the soil from the surface. It depends primarily on texture, but is also affected by structure and organic matter of the surface horizon. The same rates and classes that have been set up for permeability ratings (following table) also apply to infiltration. However, infiltration is determined by the texture of the surface horizon.

HSG - Hydrologic Soil Group

The hydrologic soil groups rate the soils according to their ability to accept and transmit water down through the profile. The HSG should be used in conjunction with other factors such as slope and vegetation to estimate the potential surface runoff. The methodology for rating the soils was developed by the Soil Conservation Service - USDA. The four groups are:

Group A - Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravel. These soils have a high rate of water transmission and normally result in a low runoff potential.

Group B - Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils, with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C - Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (a) soils with a layer that impedes the downward movement of water, or (b) soils with moderately fine to fine textures and a slow infiltration rate. These soils have a slow rate of water transmission.

Group D - Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission and usually a high runoff potential.

Permeability

Soil permeability is the quality of a soil that enables water or air to move through it. It is measured as the rate at which soil transmits water, principally downward, while saturated. The rate is based on the texture of the least permeable layer within the soil profile, but it is also influenced by structure, pore space and clay mineralogy. Certain special features are also

Texture	Textural Class	General	Perm. Class*	Perm. Rate
gravel coarse sand very coarse sand	very coarse	sandy	very rapid	>20.0
sands loamy coarse sand loamy sand	coarse		rapid	6.0-20.0
coarse sandy loam sandy loam fine sandy loam	moderately coarse		moderately rapid	2.0-6.0
very fine sandy loam loam silt loam silt	medium	loamy	moderate	0.6-2.0
clay loam sandy clay loam silty clay loam	moderately fine		moderately slow	0.2-0.6
sandy clay silty clay clay (40-60% clay)	fine	clayey	slow	0.06-0.2
clay (>60% clay) claypan, hardpan, rock	very fine		very slow	<0.06

* Rate one class lower if extremely cobbly or stony. Rate one class higher if very gravelly and two classes higher if extremely gravelly. Adapted from Soil Permeability Related to Soils, Memo - 45 (16)

considered, such as cemented horizons, rock content and clay pans.

The above chart presents the permeability ratings for soil textures and textural classes:

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.

Soil-Erodibility Factor (K)

The K factor is a value obtained for a soil, which represents that soil's physical capability to resist erosion. In this report, the K-Factor was calculated from the Wischmeier Nomograph (20). This is based on the most significant soil characteristics affecting soil erodibility, which includes texture, structure, organic matter, rock fragments by volume and permeability. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Drainage

Soil drainage refers to the capacity and extent of the removal of water from the soil, in relation to additions, especially by surface runoff and by flow through the soil to underground spaces.

There are 7 soil drainage classes. They are determined by runoff - the rate water is removed by flow over the soil surface; soil permeability - this was defined previously; and internal soil drainage - that quality of a soil that permits the downward flow of excess water through it.

The 7 soil drainage classes are as follows:

Very poorly drained: The soil is wet a greater part of the time with the water table present above 18 inches, or the top 7 inches of soil meet certain color requirements (mottles present).

Poorly drained: The soil remains wet much of the time with the water table present at depths of 18 to 36 inches, or the color requirement occurs between 7 and 20 inches.

Somewhat poorly drained: The soil is wet for significant periods, but not all of the time, usually because of a slowly permeable layer or a high water table. The water table is present at depths of 36 to 60 inches, or the mottled colors occur at depths of 20 to 36 inches.

Moderately well drained: Profile is wet for a small but significant part of the time, usually because of a slowly permeable layer within or immediately beneath the soil, a relatively high or intermittently high water table (usually below 5 feet), surface additions of water by runoff from areas higher up the slopes, or a combination of these conditions.

Well drained: Water is removed from the soil readily but not rapidly. Soils are commonly intermediate in texture. Soils are free from mottling and the water table is present at greater than 60 inches. Soil aeration is not a problem with well drained soils.

Somewhat excessively drained: Water is removed from these soils rapidly. Soils may be very shallow or shallow, may have little horizon differentiation and are sandy and very porous.

Excessively drained: Water is removed from these soils very rapidly. Soils are commonly shallow or very shallow, and may be steep, very porous or both. Most of these soils are very droughty.

Soil Manageability

The soil manageability classification 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 of soil manageability are interpretations for taxonomic units or soil map unit components.

Definitions of soil manageability classes.

Class 1. Easy to manage. Soils in this class are on stable slopes of less than 30%. They are moderately deep or deep and do not have any more than slight management problems. No management option modifiers apply to this class.

Class 2. Readily manageable. Soils in this class are on slopes of less than 30%, but have a moderate management option modification, such as moderate erosion potential.

Class 3. Moderately difficult to manage. Soils in this class are on steep slopes (30 to 60%), or have a substantial management option modification, or both.

Class 4. Very difficult to manage. Soils in this class are on very steep slopes (>60%). They may or may not have other management option modifiers.

The management option modifiers are:

"G" if the slope gradient is greater than 60 percent, and "g" if it is 30 to 60 percent; "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 25 centimeters (10 inches), and "d" if it is 25 to 50 centimeters (10 to 20 inches); "P" if the available water capacity (AWC) in 50 centimeters (20 inches) is less than 3 centimeters (1.2 inches), and "p" if it is 3 to 6 centimeters (1.2 to 2.4 inches); "W" if the wetness is poorly drained, and "w" if it is somewhat poorly drained' "X" if rock outcrop or surface boulders is greater than 15 percent, and "x" if it is 3 to 15 percent.

Soil map unit manageability groups have been developed for utilization in broad planning. These groups rate soil map units. Only one group is applied to a map unit, whereas soil manageability classes rate soil map unit components and as many classes may apply to a map unit as there are major components in the soil map unit.

The following is a list of manageability groups.

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

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

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

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

Range Type

Range type is determined by the vegetation types and subtypes that dominate the range. Range types that are present in this report are described in the following:

1. Perennial Grasslands: Open grasslands where bunch grasses and other perennial grasses predominate. Forbs, sedges and shrubs (not over 20% canopy) may also occur.

2. Meadow: Level or gently sloping areas with above average soil moisture, usually predominated by sedges, rushes, moisture-enduring grasses and forbs.

3. Perennial Forbs: Untimbered areas where perennial forbs predominate. These types may be the result of disturbance or they may be areas in pristine condition.

4. Sagebrush: Untimbered lands where sagebrush, rabbitbrush or shrubby species of similar appearance predominate.

5. Browse/Mountain Shrub/Chapparral: Untimbered lands where shrubs such as mountain mahogany, bitterbrush, willow and deerbrush predominate this type. Sagebrush is not included as a main vegetation type. The chapparral browse type is characterized by chamise, manzanita, buckwheat and ceanothus.

6. Conifer: Range in coniferous timber, usually consisting of grasses, forbs and browse.

7.& 8. Waste/Barren: Unsuitable range, and designated when necessary to differentiate them from adjacent or surrounding suitable range type.

9. Pinyon/Juniper: This type includes pinyon pine, juniper and digger pine, and differs from the conifer type in regards to location, grazing capacity and management. The forage may vary from a pure stand to a mixture of grasses, forbs and shrubs.

10. Broad Leaf Trees: This type includes range that is in deciduous timber, such as aspen, cottonwood, oak, birch, alder, ash, elm, etc. The proportion of perennial grasses, forbs and shrubs varies.

10B. Woodland/Chaparral: Dense wooded foothill areas supporting sufficient herbaceous and/or browse plants for the grazing of livestock. Herbaceous plants may be perennial or annual grasses and forbs, alone or in mixtures.

Range Sites

Range sites are broad, ecologic areas within which soils, climate and other environmental factors of strong similarity exist or are potential.

Certain range sites may occur interspersed with others within wide geographic areas; for instance subirrigated sites may be closely associated with perennial dryland, semidesert shrub, commercial timber sites, etc.

Various vegetation types (classified and mapped according to the aspect given by the dominant vegetation cover) may exist on any or all of these range sites.

A deteriorated range site may have a cover aspect completely different than the aspect it would have if the vegetation represented the potential for the site. The range sites present in this survey area are described below.

Site I. Season-Long Subirrigated (wet meadow)

1. Surface soil moisture is adequate throughout the summer.

2. Vegetation types present are
   2 - Wet meadow
   3,4,5 - occasionally present

Site II. Part-Season Subirrigated Site (dry or semi-wet meadow)

1. Soil moisture is available during the first half of summer. Vegetation becomes dry during late summer.

2. Vegetation types present are
   2 - Semi-wet or dry meadow
   3,4,5 - occasionally present

Site III. Perennial Dryland Bunchgrass Site (medium to deep soils)

1. Dry sites, other than meadows where perennial bunchgrass is dominant herbaceous vegetation.

2. Vegetation types present are
   1 - Open perennial grassland.
   3 - Wyethia
   4 - Big sagebrush/bunchgrass
   5 - Browse/mountain shrub
   6 - Pine/sagebrush/bunchgrass
   9 - Juniper/sagebrush/bunchgrass

Site IV. Perennial Dryland Bunchgrass Site (shallow, hardpan or rocky soils; frequently surface rocks)

1. Dry sites, other than dry meadows, with primarily bunchgrass.

2. Vegetation types present are
   4 - Sagebrush/bunch grass (black sage)
   5 - Bitterbrush/sagebrush/bunchgrass
   9 - Juniper/sagebrush/bunchgrass

Site VI. Woodland/Chaparral/Browse/Grass Site

1. Canopy is greater than 50% deciduous and/or 25% evergreen trees or shrubs, usually with perennial or annual grasses and forbs.

2. Vegetation types present are
   10B - Woodland/chaparral
   5 - Chaparral/browse/grass

Site VIII. Subalpine Upland Site

1. Untimbered dryland range above 8,000 feet. Immature, fragile and shallow porous soils in formative stages on ridges and steep slopes. Severe winters and cool summers.

2. Vegetation types present are
   1 - Open perennial grassland
   3 - Alpine weeds (transitional)
   4 - Sagebrush/bunchgrass
   10 - Aspen

Site IX. Commercial Timber Site

1. Coniferous timber belt generally at mid-elevations.

2. Vegetation types present are
   6 - Various combinations of conifer overstory supporting browse
   5 - Browse/mountain shrub

Annual Forage Production

Annual forage production is an estimate of the pounds per acre of forage. Two values are listed. The first entry estimates existing conditions, and the second entry estimates potential production under intense management. Steep slopes as a limiting factor have been factored into the estimates.

Forest Survey Site Class (Productivity)

The Forest Survey Site Class is an estimate of a site's suitability for commercial conifer production. It is based on soil and environmental factors such as soil depth, parent material, AWC of the total profile (to 60 inches or to a lithic contact), precipitation, temperature, aspect, pH, compaction and depth to standing water table.

The Forest Survey Site Class is a seven class system for expressing site productivity for timber, where each class is defined in terms of a range of cubic foot yields at culmination of mean annual increment in managed even-age stands:

Forest Survey Site Class	M.A.I. at Culmination (cu ft./acre/year)
1	225+
2	165-224
3	120-164
4	85-119
5	50-84
6	20-49
7	<20

Regeneration Potential

This is a relative rating of the potential for survival of bare root seedlings the first season following planting. Survival, in the absence of plant competition, can be predicted by comparing the water requirements of conifer seedlings to water storage in the upper 20 inches of soil, assuming that soils capable of supporting commercial conifer growth are completely recharged with water each winter. Water requirements can be estimated in terms of actual evapotranspiration from mean July air temperature, slope gradient and aspect factors, by a means developed by E.B. Alexander, U.S. Forest Service (1). The difference between available water storage in the upper 20 inches of soil and the estimated water requirement results in a water balance. A rating scheme for seedling survival based on this water balance is presented below:

Water Balance (inches)	Class	Chance of seedling Survival
>2.0	large surplus	high
1.1-2.0	moderate surplus	moderate
0-1.0	small surplus	low
<0	deficit	very low

Engineering Classification Systems

AASHTO

The American Association of State Highway and Transportation Officials (AASHTO) system of soil classification is based upon the observed field performance of soils under highway pavements and is widely known and used among highway engineers.

According to this system, soils having approximately the same general load-carrying capacity and service characteristics are grouped together to form seven basic groups which are designated as A-1, A-2, A-3, A-4, A-5, A-6 and A-7. In general, the best soils for highway subgrades are classified as A-1, the next best A-2 and so on with the poorest rating of soils for subgrades being those in the A-7 group.

The system is further divided into subgroups as a means of evaluating soils as subgrade materials within their groups.

AASHTO classification is based on soil texture, liquid limit and plasticity index. The AASHTO ratings assigned in this report were developed from field estimates of USDA textures and are intended as general guides.

Unified

The Unified Soil Classification system was established by the U.S. Army Corps of Engineers. It is based on the identification of soils according to their texture and plasticity, and on their performance as engineering construction materials. The Asphalt Institute (2) provides a complete discussion of the Unified Soil Classification System.

The Unified Soil Classification ratings assigned in this report were developed from field estimates of the U.S.D.A. textures and are intended as general guides. The actual Unified Soil Classification ratings may vary.

101 Aiken family, 15 to 50 percent slopes

Elevation: 2,000 to 5,200 feet Annual Precipitation: 50 to 100 inches

Soil Map Unit Components	**Aiken family**
Approximate Proportion	80%
Landscape Position	Broad ridges and sideslopes.
Slope	15 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone.

Soil Profile Description

Surface Layer	0-9 inches. Reddish brown gravelly loam; weak medium granular structure; slightly acid.
Subsoil	9-49 inches. Reddish brown gravelly clay loam; moderate very fine subangular blocky structure; slightly acid.
Substratum or Parent Material	49-67 inches. Reddish yellow silt loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Serpentinized metamorphic rock.
Available Water Capacity	
Total	7.9
Upper 20 inches	2.4
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Slow to Moderately Slow
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.15
Drainage Class	Well
Soil Manageability	
Class	2ex
Group	II
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	2 to 3
Relative Chance of Seedling Survival	Moderate
AASHTO: Surface	A-4
Subsurface	A-6
Unified: Surface	ML
Subsurface	CL
Inclusions:	20% Olete, Weitchpec, and Guemes families; Mollic Haploxeralfs; rock outcrop.

102 Aiken family-Dumps, mine tailings association, 2 to 30 percent slopes

Elevation: 600 to 1,200 feet Annual Precipitation: 50 to 70 inches

Soil Map Unit Components	Aiken family	Dumps, mine tailings
Approximate Proportion	60%	30%
Landscape Position	Dissected high terraces.	Floodplains of rivers and streams.
Slope	2 to 30 percent	
Typical Vegetation	Douglas-fir, sugar pine with tanoak and madrone.	Sparse riparian vegetation or bare.

Soil Profile Description

Surface Layer	0-9 inches. Reddish brown gravelly loam; weak medium granular structure; slightly acid.
Subsoil	9-49 inches. Reddish brown gravelly clay loam; moderate very fine angular blocky structure; medium acid.
Substratum or Parent Material	49-67 inches. Reddish yellow silt loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Weathered alluvium.	
Available Water Capacity		
Total	7.9	0.01
Upper 20 inches	2.4	
Infiltration Rate	Moderate	Very Rapid
Hydrologic Soil Group	B	A
Permeability Class	Moderately Slow	Very Rapid
Erosion Hazard, Maximum	Moderate	
Erosion Factor (K)	.15	
Drainage Class	Well	
Soil Manageability		
Class	2ex	3PX
Group	II	II
Range Type	Conifer (6)	Waste and Barren (7)
Range Site	IX	None
Annual Forage (lb/acre)	250 to 750	50
Forest Survey Site Class	2	
Relative Chance of Seedling Survival	Moderate	
AASHTO: Surface	A-4	A-1
Subsurface	A-6	A-1
Unified: Surface	ML	GP, GW
Subsurface	CL	GM or GC
Inclusions:	10% Rock outcrop, eroded terrace deposits.	

103 Avis-Oosen families complex, 15 to 50 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	Avis family	Oosen family
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes and lava flow ridges.	Mountain sideslopes.
Slope	15 to 50 percent	15 to 50 percent
Typical Vegetation	Mixed conifer, mostly white fir and red fir, snowbrush, blue elderberry, bottlebrush squirreltail.	Mixed conifer, mostly white and red fir, snowbrush, blue elderberry, bottlebrush squirreltail.

Soil Profile Description

Surface Layer	0-6 inches. Very dark grayish brown sand; single grained; slightly acid.	0-11 inches. Light yellowish brown sandy loam; weak very fine granular structure; neutral.
Subsoil		
Substratum or Parent Material	6-61+ inches. Yellowish brown very cobbly coarse sand; massive; neutral.	11-71+ inches. Pale brown to light brownish gray loamy sand; weak medium subangular blocky structure to massive; neutral;

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Volcanic ash, andesite and basalt.	60+ inches. Fractured basalt and andesite
Available Water Capacity		
Total	1.5	5.4
Upper 20 inches	0.8	1.7
Infiltration Rate	Very Rapid	Moderately Rapid
Hydrologic Soil Group	A	A
Permeability Class	Rapid	Moderately Rapid to Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.24	.24
Drainage Class	Somewhat Excessively	Somewhat Excessively
Soil Manageability		
Class	3Pex	2ex
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250 - 750	250 - 750
Forest Survey Site Class	5	4
Relative Chance of Seedling Survival	Very Low	Moderate
AASHTO: Surface	A-3	A-2-4
Subsurface	A-1	A-2-4
Unified: Surface	SP	SM
Subsurface	SP-SM	SM,ML

Inclusions: 10% Rock outcrop, Andic Xerumbrepts, soils with a clay increase in the subsoil.

104 Belzar-Wintoner, pumice overburden families complex, 2 to 15 percent slopes

Elevation: 5,000 to 7,000 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	Belzar family, pumice overburden	Wintoner family, pumice overburden
Approximate Proportion	50%	30%
Landscape Position	Mountain sideslopes and benches.	Mountain sideslopes and benches.
Slope	2 to 15 percent	2 to 15 percent
Typical Vegetation	Mixed conifer, ponderosa pine, white fir, red fir, greenleaf manzanita, snowbrush, squaw carpet.	Mixed conifer, ponderosa pine, white fir, red fir, greenleaf manzanita, snowbrush, squaw carpet.

Soil Profile Description

Surface Layer	0-7 inches. Very dark grayish brown gravelly coarse sandy loam; weak fine granular structure; slightly acid.	0-13 inches. Light yellowish brown extremely gravelly coarse sand; single grain; strongly acid.
Subsoil	7-54 inches. Brown gravelly sandy loam; weak fine and medium subangular blocky structure; medium acid.	13-64 inches. Brown sandy loam; weak to moderate medium and coarse subangular blocky structure; medium acid.
Substratum or Parent Material	54-62 inches. Brown extremely gravelly sandy loam; slightly acid.	64+ inches. Basaltic and andesitic rock and cinders.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Basalt or andesite rock.	60+ inches. Basalt, andesite and cinders.
Available Water Capacity		
Total	3.9	5.0
Upper 20 inches	1.6	0.9
Infiltration Rate	Moderately Rapid	Very Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Low	Moderate
Erosion Factor (K)	.15	.05
Drainage Class	Well to somewhat excessively	Well
Soil Manageability		
Class	2p	2e
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4 to 5	4
Relative Chance of Seedling Survival	Very low	Low
AASHTO: Surface	A-2-4	A-1
Subsurface	A-4	A-2-4
Unified: Surface	SM	SP, GW
Subsurface	ML	SM
Inclusions:	20% Soils similar to Belzar family with a lower base saturation; Redcap family.	

105 Belzar-Wintoner, pumice overburden families complex, 15 to 50 percent slopes

Elevation: 5,000 to 7,000 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	**Belzar family, pumice overburden**	**Wintoner family, pumice overburden**
Approximate Proportion	60%	20%
Landscape Position	Mountain sideslopes and ridges.	Mountain sideslopes and ridges.
Slope	15 to 50 percent	15 to 50 percent
Typical Vegetation	Mostly white fir and red fir with ponderosa pine, snowbrush, squaw carpet, bottlebrush squirreltail.	Mostly white fir and red fir with ponderosa pine, snowbrush, squaw carpet, bottlebrush squirreltail.

Soil Profile Description

Surface Layer	0-7 inches. Very dark grayish brown gravelly coarse sandy loam; weak fine granular structure; slightly acid.	0-13 inches. Light yellowish brown very gravelly coarse sand; single grain; strongly acid.
Subsoil	7-54 inches. Brown gravelly sandy loam; weak fine and medium subangular blocky structure; medium acid.	13-64 inches. Brown sandy loam; weak to moderate medium and coarse subangular blocky structure; medium acid.
Substratum or Parent Material	54-62 inches. Brown very gravelly loam; massive; slightly acid.	64+ inches. Basaltic and andesitic rock and cinders.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Fractured andesite or basalt.	60 inches. Basalt, andesite and cinders.
Available Water Capacity		
Total	3.9	5.0
Upper 20 inches	1.6	0.9
Infiltration Rate	Moderately Rapid	Very Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.15	.05
Drainage Class	Well to somewhat excessively	Well
Soil Manageability		
Class	2ep	2e
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4 to 5	4
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-2-4	A-1
Subsurface	A-4	A-2-4
Unified: Surface	SM	SP, GW
Subsurface	ML	SM
Inclusions:	20% Rock talus; soils similar to Belzar family with a lower base saturation; Redcap family.	

106 Bluesprin family-Lithic Mollic Haploxeralfs association, 30 to 70 percent slopes

Elevation: 2,500 to 4,800 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Bluesprin family	Lithic Mollic Haploxeralfs
Approximate Proportion	60%	20%
Landscape Position	Mountain sideslopes.	Mountain sideslopes, especially south-facing slopes.
Slope	30 to 50 percent	50 to 70 percent
Typical Vegetation	Oregon white oak forest with California fescue and other perennial grasses, few ponderosa pine and canyon live oak.	Buckbrush, silktassel, Oregon white oak, annual grasses, few canyon live oak, Douglas-fir, ponderosa pine, knobcone pine.

Soil Profile Description

Surface Layer	0-11 inches. Brown very gravelly loam; weak fine granular structure; neutral.	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Subsoil	11-23 inches. Brownish yellow very gravelly clay loam; weak fine and medium subangular blocky structure; neutral.	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	23+ inches. Highly fractured hard schist bedrock.	14+ inches. Fractured metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Fractured metamorphic rock.	Less than 20 inches. Metamorphic bedrock.
Available Water Capacity		
Total	1.7-5.3	1.5 Max.
Upper 20 inches	1.3	1.5
Infiltration Rate	Moderate	Moderately Rapid to Rapid
Hydrologic Soil Group	B	C
Permeability Class	Moderately Slow	Moderately Slow to Moderate
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3EX	3Edx
Group	III	III
Range Type	Broadleaf Trees & (10B) Browse Mtn Shrub Chaparral	Broadleaf Trees & (10B) Browse Mtn Shrub Chaparral
Range Site	VI	VI
Annual Forage (lb/acre)	420-700	2
Forest Survey Site Class	2 to 4	5
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-1
Subsurface	A-6	A-4
Unified: Surface	GM	GM,SM
Subsurface	SC,CL	GM
Inclusions:	20% Rock outcrop; Clallam family; Deadwood family.	

107 Buell family, 2 to 30 percent slopes

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

Soil Map Unit Components	**Buell family**
Approximate Proportion	75%
Landscape Position	Glaciated valleys.
Slope	2 to 30 percent
Typical Vegetation	Meadows of forbs and perennial grasses with scattered white bark pine, mountain hemlock, brewer spruce, red fir.

Soil Profile Description

Surface Layer	0-7 inches. Brown gravelly loam; massive; very strongly acid.
Subsoil	7-16 inches. Yellowish brown very gravelly loam; massive; very strongly acid.
Substratum or Parent Material	16-60+ inches. Light yellowish brown very gravelly loam; massive; very strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches in glacial till.
Available Water Capacity	
Total	6.6+
Upper 20 inches	1.9
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderate
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.17
Drainage Class	Well
Soil Manageability	
Class	2ex
Group	II
Range Type	Meadow (2)
Range Site	II
Annual Forage (lb/acre)	760-1,200
Forest Survey Site Class	3 to 4
Relative Chance of Seedling Survival	Moderate
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML
Subsurface	ML
Inclusions:	25% Rock outcrop; soils similar to Buell, but lacking a clay increase or color change in the subsoil; soils similar to Buell that are very poorly drained; wet areas and meadows.

108 Cinder lands

Elevation: 4,400 to 6,800 feet Annual Precipitation: 12 to 30 inches

Soil Map Unit Components	**Same soils as adjacent mapping units.**	**Similar soils as adjacent mapping units.**	**Same and similar soils as adjacent mapping units with steeper slopes and increased coarse fragment content.**
Approximate Proportion	35%	30%	20%
Landscape Position	Tops and sides of cinder cones.		
Slope	30 to 70 percent	30 to 70 percent	70 to 90 percent
Typical Vegetation	Vegetation is dependent on location. A typical vegetative cover would consist of mountain mahogany, rabbitbrush, squaw carpet, greenleaf manzanita and grasses. Occasionally western juniper, ponderosa pine, and white fir.		

Soil Profile Description

Comprised of soils formed from cinders, ash, and other pyroclastic materials. Soils occurring on the cones are of an insignificant amount and are too variable to individually identify.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Andesitic or basaltic cinders.
Available Water Capacity Total Upper 20 inches	
Infiltration Rate	
Hydrologic Soil Group	
Permeability Class	
Erosion Hazard, Maximum	
Erosion Factor (K)	
Drainage Class	
Soil Manageability Class Group	 3Xe III
Range Type	Waste & Barren (7)
Range Site	none
Annual Forage (lb/acre)	2
Forest Survey Site Class	
Relative Chance of Seedling Survival	
AASHTO: Surface Subsurface	
Unified: Surface Subsurface	
Inclusions:	15% Rock outcrop and dissimilar soils

109 Clallam family, deep, 15 to 70 percent slopes

Elevation: 1,500 to 4,800 feet Annual Precipitation: 60 to 90 inches

Soil Map Unit Components	**Clallam family, deep**
Approximate Proportion	50%
Landscape Position	Mountain sideslopes, especially north-facing slopes.
Slope	15 to 70 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.

Soil Profile Description

Surface Layer	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	30-42+ inches. Very pale brown very gravelly clay loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured metamorphic rock.
Available Water Capacity	
Total	3.3-5.1
Upper 20 inches	1.7
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Moderately Slow
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	3Xe
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	150-550
Forest Survey Site Class	3
Relative Chance of Seedling Survival	Moderately High
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	GM
Subsurface	GM
Inclusions:	50% Goldridge family; Skalan and Deadwood families on metamorphic rocks; Guemes and Dubakella families on serpentinite; rock outcrop.

110 Clallam family, very deep, 9 to 70 percent slopes

Elevation: 1,000 to 3,500 feet Annual Precipitation: 40 to 60 inches

Soil Map Unit Components	**Clallam family, very deep**
Approximate Proportion	70%
Landscape Position	Landslide deposits.
Slope	9 to 70 percent
Typical Vegetation	Douglas-fir, tanoak, madrone, California black oak, canyon live oak, mountain dogwood, deerbrush, poison oak, snowberry, sword fern.

Soil Profile Description

Surface Layer	0-8 inches. Brown gravelly sandy loam; massive; medium acid.
Subsoil	8-31 inches. Yellowish brown very gravelly sandy loam; very weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	31-60+ inches. Light yellowish brown very gravelly loamy sand; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Colluvium or unconsolidated bedrock.
Available Water Capacity	
Total	3.2
Upper 20 inches	1.0
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate to High
Erosion Factor (K)	.17
Drainage Class	Well
Soil Manageability	
Class	2ep
Group	II
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	150-550
Forest Survey Site Class	4
Relative Chance of Seedling Survival	Very Low
AASHTO: Surface	A-2-4
Subsurface	A-4
Unified: Surface	SM
Subsurface	ML
Inclusions:	30% Holland, Skalan, and Goldridge families on mixed colluvium; Guemes, Olete, and Weitchpec families on serpentinitic colluvium.

111 Clallam family, deep-very deep association, 2 to 50 percent slopes

Elevation: 3,000 to 4,800 feet Annual Precipitation: 60 to 80 inches

Soil Map Unit Components	Clallam family deep	Clallam family, very deep
Approximate Proportion	50%	30%
Landscape Position	Ground moraines.	Lateral and end moraines.
Slope	2 to 30 percent	15 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.	Douglas-fir, sugar pine, madrone, black oak, mountain dogwood.

Soil Profile Description

Surface Layer	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-8 inches. Brown gravelly sandy loam; massive; medium acid.
Subsoil	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	8-31 inches. Yellowish brown very gravelly sandy loam; very weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	30-42 inches. Very pale brown gravelly clay loam; massive; medium acid.	31-60+ inches. Light yellowish brown very gravelly loamy sand; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches in glacial till.	Greater than 60 inches in glacial till.
Available Water Capacity		
Total	3.6-5.4	3.1
Upper 20 inches	1.7	1.0
Infiltration Rate	Moderate	Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.24	.15
Drainage Class	Well	Moderately Well
Soil Manageability		
Class	2ep	3Pe
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3	3
Relative Chance of Seedling Survival	Moderate	Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	SM	SM
Subsurface	SM	SM

Inclusions: 20% Soils containing more clay are present on older moraines.

112 Clallam, deep-Deadwood families association, 50 to 90 percent slopes

Elevation: 500 to 5,000 feet Annual Precipitation: 50 to 90 inches

Soil Map Unit Components	Clallam family, deep	Deadwood family
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes and colluvial footslopes.	Mountain sideslopes and narrow ridges.
Slope	50 to 90 percent	50 to 90 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.	Canyon oak, madrone, Douglas-fir, sugar pine, poison oak, modesty flower, bracken fern.

Soil Profile Description

Surface Layer	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-2 inches. Grayish brown extremely gravelly loam; strong very fine granular structure; medium acid.
Subsoil	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	2-10 inches. Light gray extremely gravelly loam; weak very fine and fine subangular blocky structure; medium acid.
Substratum or Parent Material	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	10-16 inches. Light gray extremely gravelly loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured metamorphic rock.	Less than 20 inches. Metamorphic rock.
Available Water Capacity		
Total	3.3-5.1	1.6 Max.
Upper 20 inches	1.7	1.6
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderately Slow	Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	4Ep	4EP
Group	IV	IV
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3	4 to 5
Relative Chance of Seedling Survival	Moderate	Low to Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	GM	GM
Subsurface	GM	GM

Inclusions: 10% Rock outcrop; soils similar to Deadwood without the slight clay increase or color change in the subsoil; Holland family; Goldridge family.

113 Clallam, deep-Holland families association, 30 to 70 percent slopes

Elevation: 1,000 to 4,800 feet Annual Precipitation: 40 to 60 inches

Soil Map Unit Components	Clallam family, deep	Holland family
Approximate Proportion	60%	25%
Landscape Position	Mountain sideslopes.	Broad ridges and sideslopes.
Slope	50 to 70 percent	30 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.	Douglas-fir, ponderosa pine, sugar pine, incense cedar, black oak, deer-, brush, madrone, whiteleaf manzanita, poison oak.

Soil Profile Description

Surface Layer	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.
Subsoil	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.
Substratum or Parent Material	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured metamorphic rock.	40-60+ inches. Fractured metamorphic rock.
Available Water Capacity		
Total	3.3 - 5.1	4.8 - 6.6
Upper 20 inches	1.7	2.3
Infiltration Rate	Moderate	Moderately Slow
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderately Slow
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.10	.15
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	3ep
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	250-750
Forest Survey Site Class	3	2 to 3
Relative Chance of Seedling Survival	Moderate	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-6
Unified: Surface	GM	GM
Subsurface	GM	SC,GC,CL

Inclusions: 15% Deadwood family, on narrow ridges and very steep sideslopes; Coboc family on broad ridges; Goldridge family; rock outcrop.

114 Clallam, deep-Goldridge, gravelly families association, 30 to 90 percent slopes

Elevation: 600 to 4,500 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	Clallam family, deep	Goldridge family, gravelly
Approximate Proportion	60%	20%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and footslopes.
Slope	50 to 90 percent	30 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, deerbrush, bluegrass, bracken fern.	Douglas-fir, sugar pine, tanoak, black oak, madrone, deerbrush, poison oak, sword fern.

Soil Profile Description

Surface Layer	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-4 inches. Strong brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	4-60+ inches. Reddish yellow gravelly loam; moderate medium subangular blocky structure; medium acid.
Substratum or Parent Material	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured metamorphic rock.	40-60+ inches. Metamorphic colluvium.
Available Water Capacity		
Total	3.3-5.1	5.0-7.6
Upper 20 inches	1.7	2.0
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderately Slow to Moderate
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3EXp	3Xe
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	2	250-750
Forest Survey Site Class	3	2 to 3
Relative Chance of Seedling Survival	Moderate	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-6
Unified: Surface	GM	GM
Subsurface	GM	SC,GC,CL

Inclusions: 20% Deadwood family, on narrow ridges and very steep sideslopes; Prather family on broad ridges; rock outcrop; Coboc family.

115 Clallam family, very deep-Riverwash association, 0 to 15% slopes

Elevation: 1,000 to 3,500 feet Annual Precipitation: 40 to 75 inches

Soil Map Unit Components	Clallam family, very deep	Riverwash deposits
Approximate Proportion	40%	35%
Landscape Position	Alluvial fans and terraces.	Stream channels.
Slope	0 to 15 percent slopes.	0 to 2 percent
Typical Vegetation	Douglas-fir, sugar pine, madrone, black oak, mountain dogwood.	Mostly bare, with scattered riparian vegetation.

Soil Profile Description

Surface Layer	0-8 inches. Brown gravelly sandy loam; massive; medium acid.	Mixed alluvium on nearly level terrain adjacent to rivers and streams.
Subsoil	8-31 inches. Yellowish brown very gravelly sandy loam; very weak fine subangular blocky structure; medium acid.	
Substratum or Parent Material	31-60+ inches. Light yellowish brown very gravelly loamy sand; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in alluvium.	
Available Water Capacity		
Total	3.2	
Upper 20 inches	1.0	
Infiltration Rate	Moderately Rapid	Very Rapid
Hydrologic Soil Group	B	A
Permeability Class	Moderately Slow to Moderately Rapid	Very Rapid
Erosion Hazard, Maximum	Moderate	
Erosion Factor (K)	.17	
Drainage Class	Moderately Well	
Soil Manageability		
Class	2ep	3P
Group	II	III
Range Type	Conifer (6)	Barren & Waste (7)
Range Site	IX	
Annual Forage (lb/acre)	250-750	2
Forest Survey Site Class	4	7
Relative Chance of Seedling Survival	Very Low	N/A
AASHTO: Surface	A-2-4	A-1
Subsurface	A-4	A-1
Unified: Surface	SM	GP, GW
Subsurface	ML	GM, GC

Inclusions: 25% Soils formed in recent water-deposited sediments are present on floodplains and alluvial fan footslopes; soils with a clay increase in the subsoil; soils with a clay increase in a thick reddish subsoil on remnants of dissected alluvial fans.

116 Coboc-Holland families association, 2 to 15 percent slopes

Elevation: 1,200 to 2,000 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Coboc family	Holland family
Approximate Proportion	60%	20%
Landscape Position	High terraces.	Low and intermediate terraces.
Slope	2 to 15 percent	2 to 15 percent
Typical Vegetation	Mixed conifer forest with black oak, madrone, and some white oak.	Mixed conifer forest with black oak, madrone.

Soil Profile Description

Surface Layer	0-6 inches. Brown gravelly loam; massive; slightly acid.	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.
Subsoil	6-60+ inches. Yellowish red gravelly clay loam; moderate very fine and fine subangular blocky structure; medium acid.	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.
Substratum or Parent Material	60+ inches. Weathered alluvium.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in weathered alluvium.	Greater than 60 inches in alluvium.
Available Water Capacity		
Total	6.6	6.6
Upper 20 inches	2.5	2.3
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Slow to Moderately Slow	Moderately Slow
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.24	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	2ep
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3	3
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-6	A-7
Unified: Surface	ML-CL	ML
Subsurface	CL	MH
Inclusions:	20% Soils with a slight clay increase and color change in the subsoil are present on low terraces; hydraulic mine tailings	

117 Deadfall family-Lithic Cryoborolls association, 30 to 70 percent slopes

Elevation: 6,200 to 8,900 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	Deadfall family	Lithic Cryoborolls
Approximate Proportion	50%	30%
Landscape Position	Mountain sideslopes, especially upper slopes and ridges.	Mountain sideslopes and cirque sidewalls.
Slope	30 to 70 percent	30 to 70 percent
Typical Vegetation	Jeffrey pine, mountain hemlock, red fir, western white pine, beargrass, phlox, perennial bunchgrass.	Jeffrey pine, western white pine, beargrass, phlox, buckwheat, perennial bunchgrass.

Soil Profile Description

Surface Layer	0-6 inches. Pale brown very gravelly sandy loam; moderate very fine and fine granular structure; slightly acid.	0-10 inches. Brown very gravelly loam; weak fine granular structure; strongly acid.
Subsoil		10-18 inches. Yellowish brown very gravelly fine sandy loam; massive; medium acid.
Substratum or Parent Material	6-24 inches. Yellowish brown very gravelly sandy loam; weak very fine granular structure; neutral.	18+ inches. Hard serpentinitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Serpentinized peridotite, dunite.	Less than 20 inches. Serpentinized rock.
Available Water Capacity		
Total	0.8-1.1	1.5
Upper 20 inches	1.0	1.5
Infiltration Rate	Rapid	Moderate
Hydrologic Soil Group	A	D
Permeability Class	Moderately Rapid to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	3ePX	3EdX
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	150-550
Forest Survey Site Class	5	6 to 7
Relative Chance of Seedling Survival	Very Low	Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-1	A-4
Unified: Surface	SM	ML
Subsurface	GP,GW	SM

Inclusions: 20% Wet areas and meadows; rock outcrop; shallow soils similar to Deadfall family; deep soils similar to Lithic Cryoborolls.

118 Deadwood-Clallam deep families association, 50 to 90 percent slopes

Elevation: 500 to 5,000 feet Annual Precipitation: 45 to 75 inches

Soil Map Unit Components	Deadwood family	Clallam family, deep
Approximate Proportion	60%	25%
Landscape Position	Mountain sideslopes and narrow ridges.	Mountain sideslopes and colluvial footslopes.
Slope	50 to 90 percent	50 to 90 percent
Typical Vegetation	Canyon live oak, madrone, Douglas-fir, sugar pine, poison oak, modesty flower, bracken fern.	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.

Soil Profile Description

Surface Layer	0-2 inches. Grayish brown extremely gravelly loam; strong very fine granular structure; medium acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	2-10 inches. Light gray extremely gravelly loam; weak very fine and fine subangular blocky structure; medium acid.	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	10-16 inches. Light gray extremely gravelly loam; massive; medium acid.	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	40-60 inches. Fractured metamorphic rock.
Available Water Capacity		
Total	1.6 Max	3.3-5.1
Upper 20 inches	1.6	1.7
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderately Rapid	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	4Edx	4Epx
Group	IV	IV
Range Type	Broadleaf Trees (10)	Broadleaf Trees (10)
Range Site	VI	VI
Annual Forage (lb/acre)	2	2
Forest Survey Site Class	4 to 5	3
Relative Chance of Seedling Survival	Low to Very Low	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	GM	GM
Subsurface	GM	GM

Inclusions: 15% Rock outcrop; soils similar to Deadwood family, without the slight clay increase or color change; Skalan family.

119 Deadwood family-Rock outcrop association, 50 to 90 percent slopes

Elevation: 1,500 to 5,000 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	**Deadwood family**	**Rock outcrop**
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes and narrow ridges.	
Slope	50 to 90 percent	
Typical Vegetation	Canyon live oak, madrone, poison oak, snowberry, Douglas-fir, sword fern, and grasses.	

Soil Profile Description

Surface Layer	0-2 inches. Grayish brown extremely gravelly loam; strong very fine granular structure; medium acid.
Subsoil	2-16 inches. Light gray extremely gravelly loam; weak very fine and fine subangular blocky structure; medium acid.
Substratum or Parent Material	16+ inches. Highly fractured hard metamorphic bedrock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Highly fractured schist.	
Available Water Capacity		
Total	1.6-Max.	
Upper 20 inches	1.6	
Infiltration Rate	Moderate	
Hydrologic Soil Group	C	
Permeability Class	Moderate	
Erosion Hazard, Maximum	High	
Erosion Factor (K)	.10	
Drainage Class	Somewhat Excessively	
Soil Manageability		
Class	4EPX	
Group	IV	
Range Type	Broadleaf Trees (10)	Waste & Barren (7)
Range Site	VI	none
Annual Forage (lb/acre)	210-350	2
Forest Survey Site Class	5	
Relative Chance of Seedling Survival	Low to Very Low	
AASHTO: Surface	A-4	
Subsurface	A-4	
Unified: Surface	GM	
Subsurface	GM	
Inclusions:	15% Lithic Xerumbrepts; Clallam family; Gilligan family; Chawanakee family.	

120 Deetz family, 2 to 15 percent slopes

Elevation: 4,200 to 4,600 feet Annual Precipitation: 25 to 35 inches

Soil Map Unit Components	**Deetz family**
Approximate Proportion	80%
Landscape Position	Glacial outwash fans and plains.
Slope	2 to 15 percent
Typical Vegetation	Ponderosa pine, manzanita, squaw carpet, bitterbrush, grasses, and forbs.

Soil Profile Description

Surface Layer	0-7 inches. Very dark grayish brown gravelly loamy fine sand; weak fine granular structure; medium acid.
Subsoil	
Substratum or Parent Material	7-65+ inches. Pale brown to gray very gravelly loamy sand to sand; massive to single grain; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Ash over volcanic flow rocks.
Available Water Capacity	
Total	3.7
Upper 20 inches	1.3
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Rapid
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.24
Drainage Class	Somewhat Excessively
Soil Manageability	
Class	3Xe
Group	III
Range Type	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX
Annual Forage (lb/acre)	160-500
Forest Survey Site Class	4
Relative Chance of Seedling Survival	Very Low
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML
Subsurface	ML
Inclusions:	20% Rock outcrop; Soils similar to Deetz family with a higher percent base saturation.

121 De Masters-Smarts families association, 9 to 50 percent slopes

Elevation: 4,500 to 6,800 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	De Masters family	Smarts family
Approximate Proportion	45%	30%
Landscape Position	Mountain sideslopes and footslopes.	Volcanic mountain sideslopes and upland lava flows.
Slope	9 to 30 percent	30 to 50 percent
Typical Vegetation	White fir, red fir, ponderosa pine, Douglasfir, incense cedar, snowberry, deerbrush, squaw carpet, Idaho fescue, bottlebrush squirreltail.	Red fir, white fir, incense cedar, squaw carpet, bottlebrush squirreltail, Idaho fescue.

Soil Profile Description

Surface Layer	0-5 inches. Dark brown loam; moderate fine granular structure; neutral.	0-2 inches. Dark yellowish brown loam; moderate very fine granular structure; medium acid.
Subsoil	5-47 inches. Brown gravelly loam; weak fine subangular blocky structure; slightly acid.	2-44 inches. Brown very cobbly clay loam; moderate medium subangular blocky structure; slightly acid.
Substratum or Parent Material	47+ inches. Highly fractured tuff, breccia or andesite.	44+ inches. Hard, weathered tuff, basalt or andesite.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured tuff, breccia, andesite.	40-60+ inches. Weathered tuff, basalt, andesite.
Available Water Capacity		
Total	4.2-6.6	4.1-6.1
Upper 20 inches	2.6	2.0
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderate	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.28	.24
Drainage Class	Well	Well
Soil Manageability		
Class	2e	3E
Group	II	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3 to 4	3 to 4
Relative Chance of Seedling Survival	Moderate	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-6
Unified: Surface	ML	ML
Subsurface	ML	ML-CL

Inclusions: 25% Soils similar to De Masters and Smarts families with a thinner dark surface horizon; rock outcrop.

122 Dubakella family, 30 to 70 percent slopes

Elevation: 2,000 to 5,200 feet Annual Precipitation: 30 to 80 inches

Soil Map Unit Components	**Dubakella family**
Approximate Proportion	70%
Landscape Position	Mountain sideslopes and ridges.
Slope	30 to 70 percent
Typical Vegetation	Douglas-fir, Jeffrey pine, incense cedar, sugar pine, white oak, Idaho fescue.

Soil Profile Description

Surface Layer	0-12 inches. Reddish brown silt loam; weak fine and very fine granular structure; neutral.
Subsoil	12-33 inches. Reddish brown very gravelly clay loam or very cobbly clay; moderate coarse subangular blocky structure; neutral.
Substratum or Parent Material	33-36 inches. Light yellowish brown cobbly silty clay loam; massive; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Hard serpentinitic bedrock.
Available Water Capacity	
Total	3.2-8.5
Upper 20 inches	2.2
Infiltration Rate	Moderate
Hydrologic Soil Group	C
Permeability Class	Moderately Slow to Slow
Erosion Hazard, Maximum	High
Erosion Factor (K)	.43
Drainage Class	Well
Soil Manageability	
Class	3Ep
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	150-550
Forest Survey Site Class	3 to 4
Relative Chance of Seedling Survival	High to Moderate
AASHTO: Surface	A-4
Subsurface	A-7
Unified: Surface	ML-CL
Subsurface	CH
Inclusions:	30% Rock outcrop; Olete and Weitchpec families; shallow soils similar to Olete and Weitchpec families.

123 Endlich-Buell families association, 15 to 70 percent slopes

Elevation: 6,200 to 8,000 feet Annual Precipitation: 70 to 90 inches

Soil Map Unit Components	Endlich family	Buell family
Approximate Proportion	70%	20%
Landscape Position	Mountain sideslopes.	Periglacial sideslopes.
Slope	30 to 70 percent	15 to 50 percent
Typical Vegetation	Red fir, mountain hemlock, western white pine, pussy paws, Pyrola, Chimaphila.	Penstemon, lupine, aster, knotweed, yarrow, fescue, brome, blue wildrye, red fir, brewer spruce, whitebark pine, mountain hemlock.

Soil Profile Description

Surface Layer	0-4 inches. Dark brown loam; weak medium granular structure; extremely acid.	0-7 inches. Brown gravelly loam; massive; very strongly acid.
Subsoil	4-21 inches. Yellowish brown very gravelly to extremely cobbly fine sandy loam; weak fine granular structure to massive; strongly to very strongly acid.	7-16 inches. Yellowish brown very gravelly loam; massive; very strongly acid.
Substratum or Parent Material	21-48+ inches. Light yellowish brown extremely cobbly loamy fine sand; massive; very strongly acid.	16-60+ inches. Light yellowish brown very gravelly loam; massive; very strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured metamorphic rock.	60+ inches in glacial till.
Available Water Capacity		
Total	2.0-3.0	6.6+
Upper 20 inches	1.3	1.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderate
Erosion Hazard, Maximum	Moderate to High	Moderate to High
Erosion Factor (K)	.32	.24
Drainage Class	Well	Well
Soil Manageability		
Class	3ep	2ep
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	250-750
Forest Survey Site Class	4	4
Relative Chance of Seedling Survival	Low	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-1	A-4
Unified: Surface	ML,CL-ML	SM,GM,SM-SC
Subsurface	GM	SM,GM,SM-SC
Inclusions:	10% Teewinot family, and rock outcrop	

124 Entic Xerumbrepts-Gerle family association, 30 to 90 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 100 inches

Soil Map Unit Components	Entic Xerumbrepts	Gerle family
Approximate Proportion	60%	25%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and footslopes.
Slope	30 to 90 percent	30 to 90 percent
Typical Vegetation	Greenleaf manzanita, snowbrush, huckleberry oak, bittercherry, true fir.	True fir forest with some mountain hemlock.

Soil Profile Description

Surface Layer	0-5 inches. Grayish brown gravelly loam; moderate fine granular structure; strongly acid.	0-11 inches. Very dark grayish brown gravelly fine sandy loam; weak very fine granular structure; slightly acid.
Subsoil	5-14 inches. Pale brown gravelly loamy sand; weak fine granular structure; medium acid.	11-20 inches. Light yellowish brown gravelly fine sandy loam; massive; strongly acid.
Substratum or Parent Material	14+ inches. Soft weathered granitic rock.	20-35 inches. Light gray very gravelly fine sand; massive; strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Weathered granitic rock.	20-40 inches. Soft, weathered granitic rock.
Available Water Capacity		
Total	0.8-1.1	1.6-2.6
Upper 20 inches	1.0	1.8
Infiltration Rate	Rapid	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderate to Rapid	Moderate to Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.05	.10
Drainage Class	Well to Excessively	Well
Soil Manageability		
Class	3EPx	3Epx
Group	III	III
Range Type	Browse-Mtn Shrub (5)	Conifer (6)
Range Site	VI	IX
Annual Forage (lb/acre)	100-250	150-550
Forest Survey Site Class	4	3 to 4
Relative Chance of Seedling Survival	Very Low	Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-4	A-2-4
Unified: Surface	SM	SM
Subsurface	SM	SM

Inclusions: 15% Rock outcrop, Lithic Xerumbrepts on narrow and very steep sideslopes.

125 Entic Xerumbrepts-Gerle family-Tallac family association, 15 to 50 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 80 inches

Map Unit Components	Entic Xerumbrepts	Gerle family	Tallac family
Approx. Proportion	40%	40%	10%
Landscape Position	Mountain sideslopes, especially upper slopes.	Mountain sideslopes and ridges.	Mountain sideslopes, upperslopes and ridges.
Slope	30 to 50 percent	15 to 50 percent	15 to 20 percent
Typical Vegetation	Sparse true fir forest or dense brush fields (greenleaf manzanita, snowbrush, bittercherry, huckleberry oak).	True fir forest and mountain hemlock.	True fir, with some mixed conifer amidst brush (greenleaf manzanita, snowbrush, squaw carpet.

Soil Profile Description

Surface Layer	0-5 inches. Very dark grayish brown gravelly loam; moderate fine granular structure; strongly acid.	0-11 inches. Very dark grayish brown gravelly fine sandy loam; weak very fine granular structure; slightly acid.	0-3 inches. Very dark grayish brown loam; weak fine granular structure; medium acid.
Subsoil	5-14 inches. Pale brown gravelly loamy sand; weak fine granular structure;	11-20 inches. Light yellowish brown gravelly fine sandy loam to very gravelly fine sand; massive; strongly acid.	3-25 inches. Dark grayish brown sandy loam; weak medium granular structure; slightly acid.
Substratum or Parent Material	14+ inches. Soft weathered granodiorite.	20-35 inches. Light gray gravelly fine sand; massive; strongly acid.	25+ inches. Soft weathered granitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. weathered granodiorite.	20-40 inches. Soft, weathered granitic rock.	20-60 inches. Soft, weathered granitic rock.
Available Water Capacity			
Total	0.8-1.1	1.6-2.6	2.6-6.7
Upper 20 inches	1.0	1.8	1.4
Infiltration Rate	Rapid	Moderate	Moderate
Hydrologic Soil Group	C	B	B
Permeability Class	Moderate to Rapid	Moderate to Rapid	Moderate to Moderately Rapid
Max. Erosion Hazard	Moderate to High	Moderate	Moderate
Erosion Factor (K)	.05	.10	.20
Drainage Class	Well to Excessively	Well	Well
Soil Manageability			
Class	3Pex	2epx	2ex
Group	III	II	II
Range Type	Browse-Mtn Shrub (5)	Conifer (6)	Conifer (6)
Range Site	VI	IX	IX
Annual Forage (lb/acre)	160-500	250-750	250-750
Survey Site Class	4	3 to 4	3 to 4
Relative Chance of Seedling Survival	Very Low	Low	Moderate
AASHTO: Surface	A-2-4	A-4	A-4
Subsurface	A-2-4	A-2-4	A-2-4
Unified: Surface	SM	SM	ML
Subsurface	SM	SM	SM

Inclusions: 10% Rock outcrop; Lithic Xerumbrepts; poorly or somewhat poorly drained soils formed in recent water-deposited sediments are present in meadows and wet areas.

126 Etchen-Neuske families complex, 9 to 30 percent slopes

Elevation: 4,600 to 6,000 feet Annual Precipitation: 12 to 20 inches

Soil Map Unit Components	Etchen family	Neuske family
Approximate Proportion	50%	35%
Landscape Position	Mountain footslopes.	Mountain sideslopes and footslopes.
Slope	9 to 30 percent	9 to 30 percent
Typical Vegetation	Ponderosa pine, juniper, bitterbrush, Parry rabbitbrush, bottlebrush squirreltail, mountain mahogany.	Ponderosa pine, juniper, bitterbrush, Parry rabbitbrush, bottlebrush squirreltail, mountain mahogany.

Soil Profile Description

Surface Layer	0-9 inches. Light brownish gray sandy loam; moderate medium platy structure; neutral.	0-8 inches. Brown loam; weak very fine granular structure; slightly acid.
Subsoil	9-40 inches. Pale brown loam; moderate coarse subangular blocky structure; slightly acid.	8-27 inches. Brown loam; weak to moderate fine and medium subangular blocky structure; slightly acid.
Substratum or Parent Material	40+ inches. Hard, fractured andesite or basalt.	27-45 inches. Yellowish brown loam; weak medium subangular blocky structure; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured andesite or basalt.	20-60 inches. Fractured andesite or basalt.
Available Water Capacity		
Total	3.2-4.0	2.8-8.4
Upper 20 inches	2.6	2.8
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow to Moderate
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.28	.24
Drainage Class	Well	Well
Soil Manageability		
Class	2epx	3Epx
Group	II	III
Range Type	Conifer (6)	Conifer (6)
Range Site	III	III
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	7	5 to 7
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-2-6	A-4
Unified: Surface	SM	ML
Subsurface	SC	ML-CL

Inclusions: 15% Rock outcrop, soils lacking a dark surface horizon, and soils with a very low bulk density.

127 Gerle family-Entic Xerumbrepts association, 50 to 90 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 75 inches

Soil Map Unit Components	Gerle family	Entic Xerumbrepts
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	50 to 90 percent	50 to 90 percent
Typical Vegetation	True fir forest.	Greenleaf manzanita, snowbrush, bittercherry, huckleberry oak, true fir.

Soil Profile Description

Surface Layer	0-11 inches. Very dark grayish brown gravelly fine sandy loam; weak very fine granular structure; slightly acid.	0-5 inches. Grayish brown gravelly loam; moderate fine granular structure; strongly acid.
Subsoil	11-20 inches. Light yellowish brown gravelly fine sandy loam; massive; strongly acid.	5-14 inches. Pale brown gravelly loamy sand; weak fine gravelly structure; medium acid.
Substratum or Parent Material	20-35 inches. Light gray very gravelly fine sand; massive; strongly acid.	14+ inches. Soft weathered granitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Soft, weathered granitic rock.	Less than 20 inches. Weathered granitic rock.
Available Water Capacity		
Total	1.6-2.2	0.9-1.2
Upper 20 inches	1.8	1.0
Infiltration Rate	Moderate	Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Rapid	Moderate to Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.05
Drainage Class	Well	Well to Excessively
Soil Manageability		
Class	4EPx	4EPx
Group	IV	IV
Range Type	Conifer (6)	Browse-Mtn Shrub (5)
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	150-450
Forest Survey Site Class	4	5
Relative Chance of Seedling Survival	Low	Very Low
AASHTO: Surface	A-4	A-2-4
Subsurface	A-3	A-2-4
Unified: Surface	SM	SM
Subsurface	SP-SM	SM

Inclusions: 10% Rock outcrop, Lithic Xerumbrepts on narrow ridges and very steep sideslopes, Tallac family.

128 Gilligan-Chawanakee families association, 30 to 90 percent slopes

Elevation: 1,500 to 5,000 Annual Precipitation: 40 to 70 inches

Soil Map Unit Components	Gilligan family	Chawanakee family
Approximate Proportion	40%	35%
Landscape Position	Mountain sideslopes.	Narrow ridges and mountain sideslopes.
Slope	30 to 90 percent	30 to 90 percent
Typical Vegetation	Douglas-fir, madrone, canyon live oak, California black oak, mountain dogwood, rose, currant, sword fern.	Ponderosa pine, Douglasfir, sugar pine, canyon live oak, California black oak, deerbrush, whiteleaf manzanita.

Soil Profile Description

Surface Layer	0-11 inches. Grayish brown sandy loam; weak fine granular structure; neutral.	0-1 inches. Brown loam; moderate fine granular structure; strongly acid.
Subsoil	11-29 inches. Light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.	1-15 inches. Strong brown sandy loam to gravelly sandy loam; moderate fine subangular blocky structure; medium acid.
Substratum or Parent Material	29-47 inches. White fine sandy loam; massive; medium acid.	15+ inches. Soft decomposed granitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Soft decomposed granitic rock.	10-19 inches. Soft decomposed granitic rock.
Available Water Capacity		
Total	4.3-6.5	1.0-1.9
Upper 20 inches	2.1	1.5
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderate to Moderately Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.20	.37
Drainage Class	Somewhat Excessively	Somewhat Excessively
Soil Manageability		
Class	3Epx	3EPx
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	150-550
Forest Survey Site Class	3	4 to 5
Relative Chance of Seedling Survival	Moderate	Low to Very Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-4	A-2-4
Unified: Surface	SM	ML
Subsurface	SM	SM
Inclusions:	25% Rock outcrop, Lithic Xerorthents, granitic.	

129 Gilligan-Goldridge families association, 30 to 90 percent slopes

Elevation: 2,000 to 4,500 feet Annual Precipitation: 45 to 65 inches

Soil Map Unit Components	Gilligan family	Goldridge family
Approximate Proportion	70%	20%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and ridges.
Slope	50 to 90 percent	30 to 50 percent
Typical Vegetation	Douglas-fir, madrone, California black oak, canyon live oak, mountain dogwood, California hazelnut, rose, currant.	Douglas-fir, tanoak, giant chinquapin, madrone, Oregon grape, deerbrush.

Soil Profile Description

Surface Layer	0-11 inches. Grayish brown sandy loam; weak fine granular structure; neutral.	0-4 inches. Strong brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	11-29 inches. Light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.	4-41 inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; medium acid.
Substratum or Parent Material	29-47 inches. White fine sandy loam; massive; medium acid.	41-80+ inches. Yellow loam; massive; strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Soft decomposed granitic rock.	60+ inches. Weathered diorite or granodiorite.
Available Water Capacity		
Total	4.3-6.5	8.0
Upper 20 inches	2.1	2.9
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderately Slow
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.32	.20
Drainage Class	Somewhat Excessively	Well
Soil Manageability		
Class	4epx	4Epx
Group	IV	IV
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	250-750
Forest Survey Site Class	2 to 3	1 to 2
Relative Chance of Seedling Survival	Moderate	High to Moderate
AASHTO: Surface	A-2-4	A-4
Subsurface	A-4	A-6
Unified: Surface	SM	ML-CL
Subsurface	SM	ML-CL

Inclusions: 10% Soils similar to Deadwood on granitic rock, on narrow ridges and very steep sideslopes; rock outcrop.

130 Gilligan-Holland families association, 15 to 70 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Gilligan family	Holland family
Approximate Proportion	70%	20%
Landscape Position	Mountain sideslopes.	Broad ridges and mountain sideslopes.
Slope	50 to 70 percent	15 to 50 percent
Typical Vegetation	Douglas-fir, madrone, canyon live oak, black oak, dogwood, snowberry hazelnut, rose, currant Pacific trillium, sword fern.	Douglas-fir, ponderosa pine, sugar pine, incense cedar, black oak, deerbrush, madrone, whiteleaf manzanita, poison oak, snowberry, grasses, bracken fern.

Soil Profile Description

Surface Layer	0-11 inches. Grayish brown sandy loam; weak fine granular structure; neutral.	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.
Subsoil	11-29 inches. Light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.
Substratum or Parent Material	29-47 inches. White fine sandy loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Disintegrated granitic rock.	40-60+ inches. Disintegrated granitic rock.
Available Water Capacity		
Total	4.1-6.1	4.7-6.6
Upper 20 inches	2.1	2.3
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.28	.17
Drainage Class	Somewhat Excessively	Well
Soil Manageability		
Class	4Epx	3Epx
Group	IV	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	150-550	250-750
Forest Survey Site Class	3 to 4	3
Relative Chance of Seedling Survival	Moderate	Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-4	A-7
Unified: Surface	SM	ML
Subsurface	SM	MH

Inclusions: 10% Soils similar to Deadwood on granitic rock, present on narrow ridges and very steep sideslopes; rock outcrop; Lithic Xerorthents, granitic.

131 Goldridge family, gravelly, 15 to 50 percent slopes

Elevation: 1,000 to 4,500 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	**Goldridge family, gravelly**
Approximate Proportion	70%
Landscape Position	Landslide deposits.
Slope	15 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, California, black oak, bigleaf maple, deerbrush, poison oak, thimbleberry, iris, bracken fern.

Soil Profile Description

Surface Layer	0-4 inches. Strong brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	4-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; medium acid.
Substratum or Parent Material	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Metamorphic rock.
Available Water Capacity	
Total	8.2
Upper 20 inches	2.0
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderately Slow to Moderate
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	2ep
Group	II
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	1 to 2
Relative Chance of Seedling Survival	Moderate
AASHTO: Surface	A-4
AASHTO: Subsurface	A-6
Unified: Surface	ML-CL
Unified: Subsurface	CL
Inclusions:	30% Clallam family on mixed colluvium; Guemes, Olete, and and Weitchpec families on serpentinitic colluvium.

132 Goldridge, gravelly-Clallam, deep-Prather families association, 30 to 70 percent slopes

Elevation: 1,000 to 4,500 feet Annual Precipitation: 50 to 80 inches

Map Unit Components	Goldridge family, gravelly	Clallam family, deep	Prather family
Approx. Proportion	50%	25%	20%
Landscape Position	Broad ridges and mountain sideslopes.	Mountain sideslopes.	Landslide deposits.
Slope	30 to 50 percent	50 to 70 percent	30 to 50 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone, black oak, bigleaf maple, deerbrush, poison oak, bunchberry, bracken fern.	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.	Douglas-fir, sugar pine, tanoak, chinquapin, madrone, dogwood, snowberry, Oregon grape, poison oak, rose.

Soil Profile Description

Surface Layer	0-4 inches. Strong brown very gravelly loam; strong very fine granular structure; slightly acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-4 inches. Reddish brown gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	4-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; medium acid.	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	4-79 inches. Red clay loam; moderate fine subangular blocky structure; slightly acid.
Substratum or Parent Material		30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Metamorphic rock.	40-60 inches. Fractured metamorphic rock.	60+ inches. Metamorphic bedrock.
Available Water Capacity			
Total	7.6	3.3-5.1	10.5
Upper 20 inches	2.0	1.7	3.0
Infiltration Rate	Moderate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B	B
Permeability Class	Moderately Slow to Moderate	Moderately Slow	Moderately Slow
Max. Erosion Hazard	Moderate	Moderate	Moderate
Erosion Factor (K)	.10	.10	.15
Drainage Class	Well	Well	Well
Soil Manageability			
Class	3ep	4ep	3e
Group	III	IV	III
Range Type	Conifer (6)	Conifer (6)	Conifer (6)
Range Site	IX	IX	IX
Annual Forage (lb/acre)	250-750	150-550	250-750
Forest Survey Site Class	2 to 3	3	1 to 2
Relative Chance of Seedling Survival	Moderate	Moderate	High
AASHTO: Surface	A-4	A-4	A-4
Subsurface	A-6	A-4	A-7
Unified: Surface	GM	GM	SM,GM,SM-SC
Subsurface	SC, GC, CL	GM	CH
Inclusions:	5% Deadwood family, rock outcrop.		

133 Goldridge-Gilligan families association, 15 to 90 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 45 to 65 inches

Soil Map Unit Components	Goldridge family	Gilligan family
Approximate Proportion	75%	20%
Landscape Position	Mountain ridges and steep sideslopes.	Mountain sideslopes.
Slope	15 to 50 percent	50 to 90 percent
Typical Vegetation	Douglas-fir, tanoak, giant chinquapin, madrone, Oregon grape, deerbrush.	Douglas-fir, madrone, canyon live oak, black oak, dogwood, currant, snowberry, hazelnut.

Soil Profile Description

Surface Layer	0-4 inches. Strong brown very gravelly loam; strong very fine granular structure; slightly acid.	0-11 inches. Grayish brown sandy loam; weak fine granular structure; neutral.
Subsoil	4-41 inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; medium acid.	11-29 inches. Light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.
Substratum or Parent Material	41-80+ inches. Yellow loam; massive; strongly acid.	29-47 inches. White fine sandy loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Weathered diorite or granodiorite.	40-60 inches. Soft, weathered granodiorite.
Available Water Capacity		
Total	8.8	4.3-6.5
Upper 20 inches	2.9	2.1
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.20	.32
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	3Ep	4e
Group	III	IV
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	150-550
Forest Survey Site Class	1 to 2	2 to 3
Relative Chance of Seedling Survival	High to Moderate	Moderate
AASHTO: Surface	A-4	A-2-4
Subsurface	A-6	A-4
Unified: Surface	ML-CL	SM
Subsurface	ML-CL	SM
Inclusions:	5% Soils similar to Deadwood family on granodiorite or diorite; rock outcrop.	

134 Guemes family, 30 to 90 percent slopes.

Elevation: 1,500 to 5,000 feet Annual Precipitation: 45 to 70 inches

Soil Map Unit Components	**Guemes family**
Approximate Proportion	60%
Landscape Position	Mountain sideslopes.
Slope	30 to 90 percent
Typical Vegetation	Douglas-fir, sugar pine, Jeffrey pine, incense cedar, huckleberry oak, greenleaf manzanita, snowbrush, beargrass.

Soil Profile Description

Surface Layer	0-7 inches. Light brownish gray very gravelly loam; weak fine and very fine subangular blocky structure; slightly acid.
Subsoil	7-28 inches. Very pale brown gravelly clay loam; moderate medium subangular blocky structure; neutral.
Substratum or Parent Material	28+ inches. Hard serpentinitic bedrock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Hard serpentinitic bedrock.
Available Water Capacity	
Total	2.3-4.9
Upper 20 inches	1.6
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderately Slow to Moderate
Erosion Hazard, Maximum	High
Erosion Factor (K)	.15
Drainage Class	Well
Soil Manageability	
Class	3Epx
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	150-550
Forest Survey Site Class	4
Relative Chance of Seedling Survival	Moderate to Low
AASHTO: Surface	A-4
Subsurface	A-6
Unified: Surface	ML-CL
Subsurface	CL
Inclusions:	40% Olete family; Weitchpec family; shallow soils similar to Weitchpec family; Lithic Mollic Haploxeralfs; rock outcrop.

135 Haplic Durixeralfs, 0 to 15 percent slopes

Elevation: 4,400 to 5,500 feet Annual Precipitation: 16 to 30 inches

Soil Map Unit Components	**Haplic Durixeralfs**
Approximate Proportion	75%
Landscape Position	Terraces.
Slope	0 to 15 percent
Typical Vegetation	Black sagebrush, greenleaf manzanita, bottlebrush squirreltail, few ponderosa pine, western juniper.

Soil Profile Description

Surface Layer	0-8 inches. Grayish brown loam; moderate fine and medium granular structure; neutral.
Subsoil	8-35 inches. Light yellowish brown loam to cemented sandy loam; moderate medium subangular blocky structure to massive; mildly to moderately alkaline.
Substratum or Parent Material	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Cemented pan.
Available Water Capacity	
Total	2.2
Upper 20 inches	2.2
Infiltration Rate	Moderate
Hydrologic Soil Group	D
Permeability Class	Slow to Moderately Slow
Erosion Hazard, Maximum	High
Erosion Factor (K)	.37
Drainage Class	Somewhat Poorly
Soil Manageability	
Class	3Epw
Group	III
Range Type	Sagebrush (4)
Range Site	IV
Annual Forage (lb/acre)	200-600
Forest Survey Site Class	7
Relative Chance of Seedling Survival	Low
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML
Subsurface	ML
Inclusions:	25% Soils lacking a cemented horizon, and some with a darkened surface horizon.

136 Haplic Durixeralfs-Morical family association, 2 to 15 percent slopes

Elevation: 4,400 to 5,500 feet Annual Precipitation: 20 to 30 inches

	Haplic Durixeralfs	Morical family
Soil Map Unit Components		
Approximate Proportion	50%	35%
Landscape Position	Volcanic upland flats and terraces.	Volcanic upland flats.
Slope	2 to 15 percent	2 to 15 percent
Typical Vegetation	Black sagebrush, bottlebrush squirreltail, big sagebrush, bitterbrush, fescues, bluegrass, stipa, cheatgrass, forbs.	Juniper, sagebrush, rabbitbrush, annual grasses, forbs.

Soil Profile Description

Surface Layer	0-8 inches. Grayish brown loam; moderate fine and medium granular structure; neutral.	0-8 inches. Grayish brown gravelly sandy loam; moderate fine and very fine granular structure; neutral.
Subsoil	8-35 inches. Light yellowish brown loam to cemented sandy loam; moderate medium subangular blocky structure to massive; mildly to moderately alkaline.	8-25 inches. Light yellowish brown sandy clay loam; weak fine angular blocky structure; slightly acid.
Substratum or Parent Material		25+ inches. Extrusive volcanic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Cemented pan in alluvium.	20-40 inches. Extrusive volcanic rock.
Available Water Capacity		
Total	2.2	2.7-5.4
Upper 20 inches	2.2	2.3
Infiltration Rate	Moderate	Rapid
Hydrologic Soil Group	D	B
Permeability Class	Slow to Moderately Slow	Moderately Slow to Moderate
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.37	.10
Drainage Class	Somewhat Poorly	Well
Soil Manageability		
Class	3Epw	2ep
Group	III	II
Range Type	Sagebrush (4)	Pinyon-Juniper (9)
Range Site	IV	IV
Annual Forage (lb/acre)	200-600	300-600
Forest Survey Site Class	5	4 to 5
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-2-4
Subsurface		A-6
Unified: Surface	ML	SM
Subsurface		SC
Inclusions:	15% Holland family.	

137 Helvetia family, 15 to 70 percent slopes

Elevation: 3,500 to 4,800 feet Annual Precipitation: 25 to 35 inches

Soil Map Unit Components	**Helvetia family**
Approximate Proportion	75%
Landscape Position	Mountain sideslopes, footslopes, broad ridges, and benches.
Slope	15 to 70 percent
Typical Vegetation	Ponderosa pine, incense cedar, Douglas-fir, canyon live oak, black oak, lupine, stipa.

Soil Profile Description

Surface Layer	0-6 inches. Brown gravelly clay loam; moderate fine granular structure; neutral.
Subsoil	6-35 inches. Yellowish brown gravelly clay loam; weak fine subangular blocky structure; slightly acid.
Substratum or Parent Material	35+ inches. Soft highly weathered schist.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Soft, highly weathered schist.
Available Water Capacity	
Total	2.8-5.6
Upper 20 inches	2.7
Infiltration Rate	Slow
Hydrologic Soil Group	B
Permeability Class	Slow to Moderately Slow
Erosion Hazard, Maximum	Moderate to High
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	3ep
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	4
Relative Chance of Seedling Survival	High to Moderate
AASHTO: Surface	A-6
Subsurface	A-7
Unified: Surface	ML-CL
Subsurface	CL
Inclusions:	25% Soils similar to Helvetia family with a thicker dark surface horizon; Coboc family; Holland family.

138 Holland family, 15 to 50 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 40 to 70 inches

Soil Map Unit Components	**Holland family**
Approximate Proportion	70%
Landscape Position	Landslide deposits.
Slope	15 to 50 percent
Typical Vegetation	Douglas-fir, ponderosa pine, sugar pine, incense cedar, California black oak, madrone, deerbrush, white leaf manzanita, longleaf mahonia, poison oak, snowberry, rose, bracken fern.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Mixed landslide deposits.
Available Water Capacity	
Total	4.7-6.6
Upper 20 inches	2.3
Infiltration Rate	Moderately Slow
Hydrologic Soil Group	B
Permeability Class	Moderately Slow
Erosion Hazard, Maximum	High
Erosion Factor (K)	.15
Drainage Class	Well
Soil Manageability	
Class	3Ep
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	3
Relative Chance of Seedling Survival	Moderate to Low
AASHTO: Surface	A-4
AASHTO: Subsurface	A-7
Unified: Surface	ML
Unified: Subsurface	MH
Inclusions:	30% Clallam family on mixed colluvium; Guemes, Olete, and Weitchpec families on serpentinitic colluvium.

139 Holland-Aiken families association, 2 to 15 percent slopes

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

Soil Map Unit Components	Holland family	Aiken family
Approximate Proportion	50%	35%
Landscape Position	Low or intermediate terraces.	High terraces.
Slope	2 to 15 percent	2 to 15 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone.	Douglas-fir, sugar pine, tanoak, madrone.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-9 inches. Reddish brown gravelly loam; weak medium granular structure; slightly acid.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.	9-49 inches. Reddish brown gravelly clay loam; moderate very fine subangular blocky structure; slightly acid.
Substratum or Parent Material		49-67 inches. Reddish yellow silt loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in alluvium.	Greater than 60 inches in alluvium.
Available Water Capacity		
Total	6.6	7.9
Upper 20 inches	2.3	2.4
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Slow to Moderately Slow
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.10	.15
Drainage Class	Well	Well
Soil Manageability		
Class	2e	2e
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3	4
Relative Chance of Seedling Survival	Moderate	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-6	A-6
Unified: Surface	ML-CL	ML
Subsurface	CL	CL

Inclusions: 15% Soils with a slight clay increase and color change in the subsoil are present on low terraces; hydraulic mine tailings.

140 Holland-Aiken-Clallam, deep families complex, 15 to 70 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 90 inches

Map Unit Components	Holland family	Aiken family	Clallam family, deep
Approx. Proportion	40%	20%	20%
Landscape Position	Broad ridges and sideslopes.	Broad ridges and sideslopes.	Mountain sideslopes.
Slope	15 to 50 percent	15 to 50 percent	30 to 70 percent
Typical Vegetation	Douglas-fir, sugar pine, tanoak, madrone.	Douglas-fir, sugar pine, tanoak, madrone.	Douglas-fir, sugar pine, incense cedar, madrone, Oregon grape, deerbrush, bracken fern, grasses.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-9 inches. Reddish brown gravelly loam; weak medium granular structure; slightly acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.	9-49 inches. Reddish brown gravelly clay loam; moderate very fine subangular blocky structure; slightly acid.	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material		49-67 inches. Reddish yellow silt loam; massive; slightly acid.	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured ultrabasic rock.	60+ inches. Serpentinized metamorphic rock.	40-60 inches. Metamorphic bedrock.
Available Water Capacity			
Total	5.1-6.6	7.9	3.3-5.1
Upper 20 inches	2.3	2.4	1.7
Infiltration Rate	Moderate	Moderate	Moderate
Hydrologic Soil Group	B	B	B
Permeability Class	Moderately Slow	Slow to Moderately Slow	Moderately Slow
Erosion Hazard, Maximum	Moderate to High	Moderate	Moderate
Erosion Factor (K)	.10	.15	.10
Drainage Class	Well	Well	Well
Soil Manageability			
Class	3E	2e	3ep
Group	III	II	III
Range Type	Conifer (6)	Conifier (6)	Conifer (6)
Range Site	IX	IX	IX
Annual Forage (lb/acre)	250-750	250-750	150-550
Forest Survey Site Class	3	2 to 3	3 to 4
Relative Chance of Seedling Survival	Low	Moderate	Low
AASHTO: Surface	A-4	A-4	A-4
Subsurface	A-6	A-6	A-4
Unified: Surface	ML-CL	ML	GM
Subsurface	CL	CL	GM

Inclusions: 20% Deadwood family on metamorphic rocks; Guemes, shallow soils similar to Guemes, and Mollic Haploxeralfs on serpentinite.

141 Holland-Clallam, deep-Coboc families association, 15 to 70 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 40 to 60 inches

Map Unit Components	Holland family	Clallam family, deep	Coboc family
Approx. Proportion	50%	25%	20%
Landscape Position	Broad ridges and mountain sideslopes.	Mountain sideslopes.	Mountain footslopes and landslide deposits.
Slope	30 to 50 percent	50 to 70 percent	15 to 50 percent
Typical Vegetation	Douglas-fir, ponderosa pine, incense cedar, black oak, madrone, deerbrush, white leaf manzanita, currant, Oregon grape, poison oak, snowberry, bracken fern.	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.	Deerbrush, white leaf manzanita, ponderosa pine, Douglas-fir, incense cedar, knobcone pine, madrone, black oak, white oak, canyon live oak.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-6 inches. Brown gravelly loam; massive; slightly acid.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.	7-30 inches. Light yellowish brown very gravelly clay loam; weak fine subangular blocky structure; medium acid.	6-60+ inches. Yellowish red gravelly clay loam; moderate very fine and fine subangular blocky structure; medium acid.
Substratum or Parent Material		30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured metamorphic rock.	40-60 inches. Fractured metamorphic rock.	60+ inches. Metamorphic colluvial rock.
Available Water Capacity			
Total	4.7-6.6	3.3-5.1	6.6
Upper 20 inches	2.3	1.7	2.5
Infiltration Rate	Moderately Slow	Moderate	Moderate
Hydrologic Soil Group	B	B	B
Permeability Class	Moderately Slow	Moderately Slow	Slow to Moderately Slow
Max. Erosion Hazard	High	Moderate	High
Erosion Factor (K)	.15	.10	.24
Drainage Class	Well	Well	Well
Soil Manageability			
Class	3Ep	4ep	3Ep
Group	III	IV	III
Range Type	Conifer (6)	Conifer (6)	Broadleaf Trees (10)
Range Site	IX	IX	V
Annual Forage (lb/acre)	250-750	150-550	420-700
Survey Site Class	2 to 4	3	2 to 3
Relative Chance of Seedling Survival	Moderate to Low	Moderate	Moderate to Low
AASHTO: Surface	A-4	A-4	A-4
Subsurface	A-7	A-4	A-6
Unified: Surface	ML	GM	ML-CL
Subsurface	MH	GM	CL
Inclusions:	5% Deadwood family, rock outcrop.		

142 Holland-Gilligan families association, 30 to 90 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Holland family	Gilligan family
Approximate Proportion	75%	20%
Landscape Position	Mountain sideslopes and colluvial footslopes.	Mountain sideslopes.
Slope	30 to 50 percent	50 to 90 percent
Typical Vegetation	Douglas-fir, white fir, incense cedar, sugar pine, ponderosa pine, madrone, black oak, canyon live oak, deerbrush, whiteleaf manzanita.	Douglas-fir, white fir, incense cedar, sugar pine, ponderosa pine, madrone, black oak, canyon live oak, deerbrush, whiteleaf manzanita.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-11 inches. brown sandy loam; weak fine granular structure; neutral.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.	11-29 inches. Light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.
Substratum or Parent Material		29-47 inches. White fine sandy loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Disintegrated granitic rock.	40-60 inches. Disintegrated granitic rock.
Available Water Capacity		
Total	4.7-6.6	4.1-6.1
Upper 20 inches	2.3	2.1
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.17	.28
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	3Ep	4Ep
Group	III	IV
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	2
Forest Survey Site Class	3	3 to 4
Relative Chance of Seedling Survival	Low	Moderate
AASHTO: Surface	A-4	A-2-4
Subsurface	A-7	A-4
Unified: Surface	ML	SM
Subsurface	MH	SM

Inclusions: 5% Soils similar to Deadwood on granitic rock; rock outcrop.

143 Holland-Skalan families association, 15 to 30 percent slopes.

Elevation: 1,500 to 5,200 feet Annual Precipitation: 30 to 55 inches

Soil Map Unit Components	Holland family	Skalan family
Approximate Proportion	55%	30%
Landscape Position	Broad mountain sideslopes and landslide benches.	Mountain sideslopes and landslide deposits.
Slope	15 to 30 percent	15 to 30 percent
Typical Vegetation	Douglas-fir, ponderosa pine, incense cedar, sugar pine, madrone, black oak, white oak, deerbrush, squaw carpet, whiteleaf manzanita, vetch, fescue, brome.	Douglas-fir, ponderosa pine, incense cedar, sugar pine, white fir, black oak, madrone, deerbrush, whiteleaf and pinemat manzanita, snowberry, vetch, fescue.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-5 inches. Brown very gravelly loam; moderate fine subangular blocky structure; medium to strongly acid.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.	5-26 inches. Light reddish brown very gravelly loam; weak to moderate subangular blocky structure; medium acid.
Substratum or Parent Material		26-32 inches. Light yellowish very gravelly loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Soft, weathered mica schist.	20-60 inches. Highly fractured mica schist.
Available Water Capacity		
Total	4.1-6.9	2.6-6.0
Upper 20 inches	2.3	1.7
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderate
Erosion Hazard, Maximum	High	Moderate to High
Erosion Factor (K)	.37	.37
Drainage Class	Well	Well
Soil Manageability		
Class	3E	3Ep
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	2 to 3	2 to 3
Relative Chance of Seedling Survival	Moderate	Moderate to Low
AASHTO: Surface	A-4	A-4
Subsurface	A-7	A-4
Unified: Surface	ML	ML
Subsurface	MH	ML

Inclusions: 15% Clallam, Deadwood, Coboc, and Decy families; areas with slopes greater than 30 percent.

144 Holland-Skalan families association, 30 to 70 percent slopes

Elevation: 2,500 to 5,200 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Holland family	Skalan family
Approximate Proportion	40%	30%
Landscape Position	Broad ridges, mountain sideslopes and colluvial footslopes.	Mountain sideslopes.
Slope	30 to 50 percent	30 to 70 percent
Typical Vegetation	Douglas-fir, ponderosa pine, incense cedar, sugar pine, white fir, madrone, black oak, poison oak, whiteleaf manzanita, deerbrush, Oregon grape.	Douglas-fir, ponderosa pine, incense cedar, sugar pine, white fir, black and white oak, mountain mahogany, whiteleaf manzanita, Oregon grape, perennial grasses.

Soil Profile Description

Surface Layer	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.	0-5 inches. Brown very gravelly loam; moderate fine subangular blocky structure; medium to strongly acid.
Subsoil	8-60+ inches. Reddish yellow gravelly clay loam; moderate subangular blocky structure; strongly acid.	5-26 inches. Light reddish brown very gravelly loam; weak to moderate subangular blocky structure; medium acid.
Substratum or Parent Material		26-32 inches. Light yellowish brown very gravelly loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured metamorphic rock.	20-40 inches. Fractured metamorphic rock.
Available Water Capacity		
Total	4.7-6.6	1.6-3.2
Upper 20 inches	2.3	1.7
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.15	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3Epx
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	150-550
Forest Survey Site Class	2 to 4	3 to 5
Relative Chance of Seedling Survival	Moderate to Low	Moderate to Low
AASHTO: Surface	A-4	A-4
Subsurface	A-7	A-4
Unified: Surface	ML	GM
Subsurface	MH	GM

Inclusions: 30% Lithic Haploxeralfs; Deadwood family; rock outcrop, Coboc family; Clallam family.

145 Inville family, 15 to 50 percent slopes

Elevation: 5,000 to 6,000 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	**Inville family**
Approximate Proportion	75%
Landscape Position	Volcanic sideslopes, ridges and flowends.
Slope	15 to 50 percent
Typical Vegetation	Ponderosa pine, Douglasfir, white fir, red fir, greenleaf manzanita, rabbitbrush, snowbrush, bitterbrush, ribes, fescue, bottlebrush squirreltail.

Soil Profile Description

Surface Layer	0-7 inches. Brown gravelly loam; weak very fine granular structure; medium acid.
Subsoil	7-30 inches. Reddish brown gravelly to very cobbly loam; moderate medium subangular blocky structure; strongly acid.
Substratum or Parent Material	30+ inches. Soft weathered olivine basalt.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Soft, weathered olivine basalt.
Available Water Capacity	
Total	2.2-6.6
Upper 20 inches	2.4
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.24
Drainage Class	Well
Soil Manageability	
Class	2ep
Group	II
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	4 to 5
Relative Chance of Seedling Survival	Low
AASHTO: Surface	A-6
Subsurface	A-2
Unified: Surface	CL
Subsurface	GM or GC
Inclusions:	25% Soils similar to Inville, with less rock fragments; soils without a clay increase in the subsoil; soils similar to Inville with a dark surface horizon; rock outcrop.

146 Inville-Wintoner families complex, 2 to 15 percent slopes

Elevation: 5,000 to 6,000 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	Inville family	Wintoner family
Approximate Proportion	60%	25%
Landscape Position	Volcano footslopes and flow terraces.	Volcano footslopes and flow terraces.
Slope	2 to 15 percent	2 to 15 percent
Typical Vegetation	Ponderosa pine, white fir, incense cedar, Douglas-fir, knobcone pine, red fir, snowbrush, chinquapin, currant, squaw carpet, bitterbrush, greenleaf and pinemat manzanita.	Douglas-fir, ponderosa pine, incense cedar, deerbrush, currant.

Soil Profile Description

Subsoil	7-30 inches. Reddish brown gravelly to very cobbly loam; moderate medium subangular blocky structure; strongly acid.	11-60 inches. Light reddish brown gravelly to extremely gravelly loam; moderate fine subangular blocky structure; slightly acid to mildly alkaline.
Substratum or Parent Material	30+ inches. Highly weathered and disintegrated andesite or basalt over hard rock.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Andesite or basalt over hard rock.	40+ inches. Andesite, basalt, metamorphic rock.
Available Water Capacity		
Total	2.2-6.6	4.8-7.2
Upper 20 inches	2.4	0.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.24	.32
Drainage Class	Well	Well
Soil Manageability		
Class	2ep	2e
Group	II	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4 to 5	4 to 5
Relative Chance of Seedling Survival	Low	Moderate
AASHTO: Surface	A-6	A-6
AASHTO: Subsurface	A-2	A-4
Unified: Surface	CL	CL
Unified: Subsurface	GM or GC	ML-CL

Inclusions: 15% Soils similar to Inville and Wintoner but containing less clay or having a darkened surface horizon; rock outcrop.

147 Inville-Wintoner families complex, 30 to 50 percent slopes.

Elevation: 4,900 to 6,800 feet Annual Precipitation: 55 to 65 inches

Soil Map Unit Components	Inville family	Wintoner family
Approximate Proportion	50%	30%
Landscape Position	Undulating mountain sideslopes and broad ridges with many benches.	Undulating mountain sideslopes and broad ridges with many slump benches.
Slope	30 to 50 percent	30 to 50 percent
Typical Vegetation	True fir forest with some incense cedar and sugar pine, rose, gooseberry, snowberry.	True fir forest with some incense cedar and sugar pine, rose, gooseberry, snowberry.

Soil Profile Description

Surface Layer	0-7 inches. Brown gravelly loam; weak very fine granular structure; medium acid.	0-11 inches. Grayish brown gravelly loam; moderate fine and medium granular structure; neutral.
Subsoil	7-30 inches. Reddish brown gravelly to very cobbly loam; moderate medium subangular blocky structure; strongly acid.	11-60 inches. Light reddish brown gravelly to extremely gravelly loam; moderate fine subangular blocky structure; slightly acid to mildly alkaline.
Substratum or Parent Material	30+ inches. Weathered and disintegrated andesite, basalt, or mixed metamorphic rock.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60+ inches. Andesite, basalt, metamorphic rock.	40-60 inches. Andesite, basalt, metamorphic rock.
Available Water Capacity		
Total	2.2-6.6	4.8-7.2
Upper 20 inches	2.4	0.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate to High	Moderate to High
Erosion Factor (K)	.24	.32
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	3E
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	2 to 3	2 to 3
Relative Chance of Seedling Survival	Moderate to Low	Moderate to Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	ML-CL	ML-CL
Subsurface	ML-CL	ML-CL
Inclusions:	20% Tallac and Woodseye families.	

148 Jayar family, 30 to 70 percent slopes

Elevation: 5,000 to 6,800 feet Annual Precipitation: 30 to 40 inches

Soil Map Unit Components	**Jayar family**
Approximate Proportion	75%
Landscape Position	Mountain sideslopes.
Slope	30 to 70 percent
Typical Vegetation	Ponderosa pine, white fir, Douglas-fir, red fir, snowberry, currant.

Soil Profile Description

Surface Layer	0-2 inches. Brown very gravelly loam; strong very fine and fine granular structure; slightly, acid.
Subsoil	2-24 inches. Yellowish brown very gravelly loam; moderate very fine and fine subangular blocky structure to massive; slightly acid.
Substratum or Parent Material	24-34 inches. Pale yellow very gravelly sandy loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Metamorphic or granitic rocks.
Available Water Capacity	
Total	1.5-3.4
Upper 20 inches	1.8
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.05
Drainage Class	Well
Soil Manageability	
Class	3Pex
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	150-550
Forest Survey Site Class	4 to 5
Relative Chance of Seedling Survival	Low
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML
Subsurface	SM
Inclusions:	25% Rogue family soils with clay increase in the subsoil; very young soils lacking diagnostic horizons; rock outcrop.

149 Jayar family-Lithic Mollic Haploxeralfs association, 30 to 70 perce

Elevation: 4,800 to 6,800 feet Annual Precipitation: 45 to 55 inches

Soil Map Unit Components	Jayar family	Lithic Mollic Haploxeralfs
Approximate Proportion	50%	25%
Landscape Position	Mountain sideslopes and colluvial footslopes.	Mountain sideslopes and ridges.
Slope	30 to 70 percent	30 to 70 percent
Typical Vegetation	White fir, Douglas-fir, pinemat manzanita, greenleaf manzanita, lupine.	Curlyleaf mountain mahogany, greenleaf manzanita, big sagebrush, huckleberry oak, buckwheat, white fir, western juniper with bare ground and gravel pavement.

Soil Profile Description

Surface Layer	0-2 inches. Brown very gravelly loam; strong very fine and fine granular structure; slightly acid.	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Subsoil	2-24 inches. Yellowish brown very gravelly loam; moderate fine and very fine subangular blocky structure to massive; slightly acid.	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	24-34 inches. Pale yellow very gravelly sandy loam; massive; slightly acid.	14+ inches. Fractured metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Fractured metamorphic rock.	Less than 20 inches. Metamorphic rock.
Available Water Capacity		
Total	1.6-3.7	1.5 Max.
Upper 20 inches	1.8	1.5
Infiltration Rate	Moderate	Moderately Rapid to Rapid
Hydrologic Soil Group	B	C
Permeability Class	Moderate to Moderately Rapid	Moderately Slow to Moderate
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Pex	3Epx
Group	III	III
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	100-300
Forest Survey Site Class	3 to 4	5
Relative Chance of Seedling Survival	Low	Low to Very Low
AASHTO: Surface	A-4	A-1
Subsurface	A-4	A-4
Unified: Surface	GM	GM,SM
Subsurface	GM	GM

Inclusions: 25% Rock outcrop; talus; Wintoner family; Inville family; Woodseye family.

150 Jayar-Woodseye families association, 30 to 70 percent slopes

Elevation: 4,800 to 7,000 feet Annual Precipitation: 60 to 100 inches

Soil Map Unit Components	Jayar family	Woodseye family
Approximate Proportion	60%	30%
Landscape Position	Colluvial footlsopes.	Mountain sideslopes and ridges.
Slope	30 to 70 percent	50 to 70 percent
Typical Vegetation	Red fir, mountain hemlock, white fir, snowbrush, sadler oak, strawberry shinleaf.	Huckleberry oak, greenleaf manzanita, bittercherry, snowbrush, buckwheat, Indian paintbrush, lupine, red fir, white fir, incense cedar.

Soil Profile Description

Surface Layer	0-2 inches. Brown very gravelly loam; strong very fine granular structure; slightly acid.	0-7 inches. Dark grayish brown very gravelly loam; moderate very fine granular structure; strongly acid.
Subsoil	2-24 inches. Yellowish brown very gravelly loam; moderate fine and very fine subangular blocky structure to massive; slightly acid.	
Substratum or Parent Material	24-34 inches. Pale yellow very gravelly sandy loam; massive; slightly acid.	7-19 inches. Brown very gravelly loam; massive; very strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Fractured metamorphic rock.	Less than 20 inches. Metamorphic rock.
Available Water Capacity		
Total	1.6-3.7	2.1 Max.
Upper 20 inches	1.8	2.1
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderate to Moderately Rapid	Moderate
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.10	.28
Drainage Class	Well	Well
Soil Manageability		
Class	3Pex	4Epx
Group	III	IV
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	100-300
Forest Survey Site Class	2 to 3	5
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	GM	ML,CL-ML
Subsurface	GM	GM
Inclusions:	10% Rock outcrop, and deeper soils similar to Woodseye family.	

151 Kang-Beaughton families association, 9 to 90 percent slopes

Elevation: 2,000 to 4,800 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	Kang family	Beaughton family
Approximate Proportion	50%	30%
Landscape Position	Broad ridges, sideslopes, colluvial footslopes.	Ridges and sideslopes.
Slope	9 to 50 percent	30 to 90 percent
Typical Vegetation	California fescue, bottlebrush squirreltail, Jeffrey pine, incense cedar, buckbrush.	Cheatgrass, Idaho fescue, Jeffrey pine, rabbitbrush.

Soil Profile Description

Surface Layer	0-3 inches. Very dark grayish brown gravelly sandy clay loam; weak fine granular structure; neutral.	0-1 inches. Grayish brown extremely gravelly loam; weak very fine granular structure; slightly acid.
Subsoil	3-27 inches. Very dark grayish brown gravelly clay loam; moderate medium subangular blocky structure; neutral.	1-12 inches. Grayish brown very gravelly clay loam; weak very fine and fine subangular blocky structure; neutral.
Substratum or Parent Material	27+ inches. Hard fractured serpentinitic rock.	12+ inches. Hard fractured serpentinitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Fractured serpentinitic rock.	Less than 20 inches. Serpentinitic rock.
Available Water Capacity		
Total	2.3-4.5	1.7
Upper 20 inches	1.4	1.7
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Slow to Moderately Slow	Slow to Moderately Slow
Erosion Hazard, Maximum	High to very High	Very High
Erosion Factor (K)	.05	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	4Epx
Group	III	IV
Range Type	Perennial Grasslands (1)	Perennial Grasslands (1)
Range Site	III	III
Annual Forage (lb/acre)	250-500	2
Forest Survey Site Class	5	6 to 7
Relative Chance of Seedling Survival	Moderate to Low	Low to Very Low
AASHTO: Surface	A-2-6	A-4
Subsurface	A-7	A-7
Unified: Surface	SC	ML
Subsurface	CH	CH

Inclusions: 20% Rock outcrop; talus; deeper soils similar to Beaughton family; Mollic Haploxeralfs; Guemes family; Lithic Haploxeralfs.

152 Lava flows

Elevation: 5,200 to 7,000 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	**Lava Flows**
Approximate Proportion	70%
Landscape Position	
Slope	
Typical Vegetation	

Soil Profile Description

Surface Layer	
Subsoil	
Substratum or Parent Material	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	
Available Water Capacity	
Total	
Upper 20 inches	
Infiltration Rate	
Hydrologic Soil Group	
Permeability Class	
Erosion Hazard, Maximum	
Erosion Factor (K)	
Drainage Class	
Soil Manageability	
Class	
Group	
Range Type	Waste and Barren (7)
Range Site	None
Annual Forage (lb/acre)	<50
Forest Survey Site Class	
Relative Chance of Seedling Survival	
AASHTO: Surface	
Subsurface	
Unified: Surface	
Subsurface	
Inclusions:	30% Small areas of soil in the form of volcanic ejecta, volcanic dust, pumice or cinders.

153 Lithic Haploxeralfs-Holland family association, 30 to 70 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 30 to 40 inches

Soil Map Unit Components	Lithic Haploxeralfs	Holland family
Approximate Proportion	50%	20%
Landscape Position	Mountain sideslopes.	Broad ridges, mountain sideslopes and colluvial footslopes.
Slope	50 to 70 percent	30 to 50 percent
Typical Vegetation	Canyon live oak and Oregon white oak with scattered Douglas-fir and ponderosa pine, whiteleaf manzanita and poison oak, with much bare ground.	Douglas-fir, ponderosa pine, incense cedar, sugar pine, canyon live oak, Oregon white oak madrone, poison oak whiteleaf manzanita.

Soil Profile Description

Surface Layer	0-10 inches. Light yellowish brown very gravelly loam; moderate very fine and fine subangular blocky structure; slightly acid.	0-8 inches. Pink very gravelly loam; weak fine subangular blocky structure; medium acid.
Subsoil	10-13 inches. Light yellowish brown very gravelly clay loam; moderate fine subangular blocky structure; neutral.	8-60+ inches. Reddish yellow gravelly clay loam; moderate medium subangular blocky structure; strongly acid.
Substratum or Parent Material	13+ inches. Fractured, hard metamorphic rock.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	40-60 inches. Fractured metamorphic rock.
Available Water Capacity		
Total	1.8 Max.	4.8-6.6
Upper 20 inches	1.8	2.3
Infiltration Rate	Moderate	Moderately Slow
Hydrologic Soil Group	C	B
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.10	.15
Drainage Class	Well	Well
Soil Manageability		
Class	4Ex	3epx
Group	IV	III
Range Type	Woodland Chaparral (10)	Conifer (6)
Range Site	VI	IX
Annual Forage (lb/acre)	210-350	250-750
Forest Survey Site Class	5	2 to 4
Relative Chance of Seedling Survival	Low to Very Low	Moderate to Low
AASHTO: Surface	A-4	A-4
Subsurface	A-6	A-6
Unified: Surface	GM	GM
Subsurface	SC,CL	SC,GC,CL
Inclusions:	30% Rock outcrop; Deadwood family; Clallam family; Bluesprin family.	

154 Lithic Mollic Haploxeralfs-Bluesprin family association, 30 to 90 percent slopes

Elevation: 2,000 to 4,800 feet Annual Precipitation: 30 to 50 inches

	Lithic Mollic Haploxeralfs	Bluesprin family
Soil Map Unit Components		
Approximate Proportion	60%	20%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	50 to 90 percent	30 to 50 percent
Typical Vegetation	Buckbrush, silktassel, Oregon white oak, annual grasses, canyon live oak, Douglas-fir, ponderosa pine, knobcone pine.	Oregon white oak forest, with California fescue and other perennial grasses.

Soil Profile Description

Surface Layer	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.	0-11 inches. Brown very gravelly loam; weak fine granular structure; neutral.
Subsoil	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.	11-23 inches. Brownish yellow very gravelly clay loam; weak fine and medium subangular blocky structure; neutral.
Substratum or Parent Material	14+ inches. Fractured hard metamorphic rock.	23+ inches. Highly fractured metamorphic bedrock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	20-60 inches. Fractured metamorphic rock.
Available Water Capacity		
Total	1.5 Max.	1.7-5.3
Upper 20 inches	1.5	1.3
Infiltration Rate	Moderately Rapid to Rapid	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderately Slow to Moderate	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	4Epx	3Epx
Group	IV	III
Range Type	Browse-Mtn Shrub (5) and Chaparral	Woodland Chaparral (10)
Range Site	VI	VI
Annual Forage (lb/acre)	100-300	420-700
Forest Survey Site Class	5	2 to 4
Relative Chance of Seedling Survival	Low to Very Low	Low
AASHTO: Surface	A-1	A-4
AASHTO: Subsurface	A-4	A-6
Unified: Surface	GM,SM	GM
Unified: Subsurface	GM	SC,CL
Inclusions:	20% Rock outcrop and Clallam family.	

155 Lithic Mollic Haploxeralfs-Dubakella family association, 15 to 70 percent slopes

Elevation: 1,000 to 5,000 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	Lithic Mollic Haploxeralfs	Dubakella family
Approximate Proportion	45%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and benches.
Slope	30 to 70 percent	15 to 50 percent
Typical Vegetation	California fescue, bottlebrush squirreltail, Jeffrey pine, incense cedar, buckbrush, whiteleaf manzanita, 35% bare ground.	Douglas-fir, Jeffrey pine, incense cedar, sugar pine, white oak, Idaho fescue.

Soil Profile Description

Surface Layer	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.	0-12 inches. Reddish brown silt loam; weak fine and very fine granular structure; neutral.
Subsoil	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.	12-33 inches. Reddish brown very gravelly clay loam or very cobbly clay; moderate coarse subangular blocky structure; neutral.
Substratum or Parent Material	14+ inches. Hard serpentinitic rock.	33-36 inches. Light yellowish brown cobbly silty clay loam; massive; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Serpentinitic rock.	20-60 inches. Hard serpentinitic bedrock.
Available Water Capacity		
Total	1.5	3.2-8.5
Upper 20 inches	1.5	2.2
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	D	C
Permeability Class	Moderately Slow to Moderate	Slow to Moderately Slow
Erosion Hazard, Maximum	High	Moderate to High
Erosion Factor (K)	.10	.43
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3Ex
Group	III	III
Range Type	Browse-Mtn Shrub (5) and Chaparral	Conifer (6)
Range Site	IV	IX
Annual Forage (lb/acre)	50 to 100	250-750
Forest Survey Site Class	5	3 to 4
Relative Chance of Seedling Survival	Low to Very Low	High to Moderate
AASHTO: Surface	A-1	A-4
Subsurface	A-4	A-7
Unified: Surface	GM,SM	ML-CL
Subsurface	GM	CH
Inclusions:	25% Lithic Xerorthents, ultramafic; rock outcrop; Olete and Weitchpec families.	

156 Lithic Mollic Haploxeralfs-Rock outcrop association, 30 to 70 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 40 to 60 inches

	Lithic Mollic Haploxeralfs	Rock outcrop
Soil Map Unit Components		
Approximate Proportion	50%	30%
Landscape Position	Mountain sideslopes and ridges.	Mountain sideslopes, ridges and cliffs.
Slope	30 to 70 percent	
Typical Vegetation	Curlyleaf mountain mahogany, greenleaf manzanita big sagebrush, huckleberry oak, buckwheat, few white fir and western juniper, bare ground with gravel pavement.	

Soil Profile Description

Surface Layer	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Subsoil	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	14+ inches. Hard fractured metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	
Available Water Capacity		
Total	1.5 Max.	
Upper 20 inches	1.5	
Infiltration Rate	Moderate	
Hydrologic Soil Group	C	
Permeability Class	Moderately Slow to Moderate	
Erosion Hazard, Maximum	High	
Erosion Factor (K)	.10	
Drainage Class	Well	
Soil Manageability		
Class	3 EXp	
Group	III	
Range Type	Browse-Mtn Shrub (5) and Chaparral	Waste & Barren (7)
Range Site	VI	none
Annual Forage (lb/acre)	50-100	2
Forest Survey Site Class	5	
Relative Chance of Seedling Survival	Very Low to Low	
AASHTO: Surface	A-1	
Subsurface	A-4	
Unified: Surface	GM, SM	
Subsurface	GM	
Inclusions:	20% Rogue family; Jayar family; Wintoner family; Inville family; talus, and very shallow soils. Geomorphic position is colluvial footslopes.	

157 Lithic Ruptic-Xerochreptic Haploxeralfs-Olete family association, 30 to 90 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 80 inches

Soil Map Unit Components	Lithic RupticXerochreptic Haploxeralfs	Olete family
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and colluvial footslopes.
Slope	50 to 90 percent	30 to 70 percent
Typical Vegetation	Jeffrey pine, incense cedar, Douglas-fir, white leaf manzanita, huckleberry oak, silktassel, buckbrush, madrone.	Huckleberry oak, pinemat manzanita, California bay, silktassel, coffeeberry, Jeffrey pine, incense cedar, Douglas-fir.

Soil Profile Description

Surface Layer	0-1 inches. Reddish brown loam; moderate very fine granular structure; medium acid.	0-3 inches. Strong brown very gravelly loam; moderate fine granular structure; strongly acid.
Subsoil	1-17 inches. Red clay loam; moderate medium subangular blocky structure; medium acid.	3-40 inches. Reddish yellow very gravelly loam; moderate fine subangular blocky structure; strongly to medium acid.
Substratum or Parent Material	17+ inches. Hard peridotite rock.	40-60 inches. Yellow very gravelly loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Hard peridotite bedrock.	40-60+ inches. Fractured peridotite bedrock.
Available Water Capacity		
Total	1.9	3.0-4.0
Upper 20 inches	1.9	1.3
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.20	.10
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	4Ex	4Epx
Group	IV	IV
Range Type	Browse-Mtn Shrub (5) and Chaparral	Browse-Mtn Shrub (5) and Chaparral
Range Site	VI	VI
Annual Forage (lb/acre)	100-300	100-300
Forest Survey Site Class	5	4
Relative Chance of Seedling Survival	Very Low	Low to Moderate
AASHTO: Surface	A-4	A-4
AASHTO: Subsurface	A-6	
Unified: Surface	ML	ML-CL
Unified: Subsurface	CL	
Inclusions:	10% Rock outcrop and talus. Guemes family on colluvial slopes.	

158 Lithic Ruptic-Xerochreptic Haploxeralfs-Parks family association, 30 to 90 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 70 to 100 inches

Soil Map Unit Components	Lithic RupticXerochreptic Haploxeralfs	Parks family
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	50 to 90 percent	30 to 70 percent
Typical Vegetation	Huckleberry oak, silktassel, coffeeberry, squaw carpet, greenleaf and pinemat manzanita, Jeffrey pine, incense cedar, beargrass.	Western white pine, white fir, red fir, incense cedar, pinemat manzanita, currant.

Soil Profile Description

Surface Layer	0-1 inches. Reddish brown loam; moderate very fine granular structure; medium acid.	0-7 inches. Yellowish red gravelly fine sandy loam; moderate very fine and fine granular structure; neutral.
Subsoil	1-17 inches. Red clay loam; moderate medium subangular blocky structure; medium acid.	7-33 inches. Yellowish red gravelly fine sandy loam; weak moderate and coarse subangular blocky structure; neutral.
Substratum or Parent Material	17+ inches. Hard peridotite.	33-37 inches. Strong brown very gravelly fine sandy loam; massive; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	10-20 inches. Hard peridotite bedrock.	20-40 inches. Hard dunite bedrock.
Available Water Capacity		
Total	1.9	1.8-3.4
Upper 20 inches	1.9	1.3
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderately Slow to Moderately Rapid	Moderate to Rapid
Erosion Hazard, Maximum	High	Moderate to High
Erosion Factor (K)	.20	.24
Drainage Class	Well	Well
Soil Manageability		
Class	4Ex	3Epx
Group	IV	III
Range Type	Browse-Mtn Shrub (5) and Chaparral	Browse-Mtn Shrub (5) and Chaparral
Range Site	VI	VI
Annual Forage (lb/acre)	100-300	100-300
Forest Survey Site Class	5 to 6	4 to 5
Relative Chance of Seedling Survival	Very Low	Low to Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-6	A-4
Unified: Surface	ML	SM
Subsurface	CL	SM
Inclusions:	10% Rock outcrop and talus; Lithic Xerorthents, cold.	

159 Lithic Xerorthents, cold-Rock outcrop 30 to 90 percent slopes

Elevation: 5,000 to 7,000 feet Annual Precipitation: 50 to 90 inches

	Lithic Xerorthents, cold	Rock outcrop
Soil Map Unit Components		
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes.	
Slope	30 to 90 percent	
Typical Vegetation	Huckleberry oak, coffeeberry, buckwheat, phlox, beargrass, Jeffrey pine, incense cedar, western, white pine.	

Soil Profile Description

Surface Layer	0-3 inches. Brown gravelly loamy sand; weak very fine granular structure; neutral.
Subsoil	3-9 inches. Strong brown very gravelly loamy sand; massive; neutral.
Substratum or Parent Material	9+ inches. Hard dunite.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Hard dunite bedrock.	
Available Water Capacity		
Total	0.8	
Upper 20 inches	0.8	
Infiltration Rate	Moderately Rapid	
Hydrologic Soil Group	D	
Permeability Class	Rapid	
Erosion Hazard, Maximum	High	
Erosion Factor (K)	.10	
Drainage Class	Excessively	
Soil Manageability		
Class	4EPX	
Group	IV	
Range Type	Browse-Mtn Shrub (5) and Chaparral	Waste & Barren (7)
Range Site	VI	none
Annual Forage (lb/acre)	75-200	2
Forest Survey Site Class	5 to 7	
Relative Chance of Seedling Survival	Very Low	
AASHTO: Surface	A-4	
Subsurface		
Unified: Surface	ML	
Subsurface		

Inclusions: 15% Parks; shallow soils similar to Parks; Toadlake family; Lithic Ruptic-Xerochreptic Haploxeralfs.

160 Lithic Xerorthents, granitic-Rock outcrop association, 50 to 90 percent slopes

Elevation: 1,500 to 5,000 feet Annual Precipitation: 40 to 60 inches

	Lithic Xerorthents, granitic	Rock outcrop
Soil Map Unit Components		
Approximate Proportion	45%	30%
Landscape Position	Mountain sideslopes.	
Slope	50 to 90 percent	
Typical Vegetation	Canyon live oak, madrone, whiteleaf manzanita, poison oak, Douglas-fir, ponderosa pine, sugar pine.	

Soil Profile Description

Surface Layer	0-3 inches. Brown sandy loam; massive; medium acid.
Subsoil	3-7 inches. Pale brown sandy loam; massive; medium acid.
Substratum or Parent Material	7+ inches. Weathered granitic bedrock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Weathered granitic rock.	
Available Water Capacity		
Total	0.7-1.9	
Upper 20 inches	1.3	
Infiltration Rate	Moderately Rapid	
Hydrologic Soil Group	A	
Permeability Class	Moderate to Rapid	
Erosion Hazard, Maximum	Very High	
Erosion Factor (K)	.37	
Drainage Class	Excessively	
Soil Manageability		
Class	4EPX	
Group	IV	
Range Type	Broadleaf trees (10)	Waste & Barren (7)
Range Site	VI	None
Annual Forage (lb/acre)	2	2
Forest Survey Site Class	5 to 7	
Relative Chance of Seedling Survival	Low to Very Low	
AASHTO: Surface	A-2-4	
Subsurface	A-2-4	
Unified: Surface	SM	
Subsurface	SM	
Inclusions:	25% Soils with a slight clay increase and color change in the subsoil are present on colluvial slopes.	

161 Lithic Xerorthents, ultramafic, 30 to 70 percent slopes

Elevation: 1,500 to 5,000 feet Annual Precipitation: 50 to 100 inches

Soil Map Unit Components	**Lithic Xerorthents, ultramafic**
Approximate Proportion	90%
Landscape Position	Mountain sideslopes.
Slope	30 to 70 percent
Typical Vegetation	Jeffrey pine, incense cedar, huckleberry oak, coffeeberry, pinemat manzanita, beargrass.

Soil Profile Description

Surface Layer	0-9 inches. Light brownish gray gravelly loam; massive; neutral.
Subsoil	
Substratum or Parent Material	9+ inches. Fractured serpentinitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Hard fractured bedrock.
Available Water Capacity	
Total	1.0
Upper 20 inches	1.0
Infiltration Rate	Moderate
Hydrologic Soil Group	D
Permeability Class	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Very High
Erosion Factor (K)	.24
Drainage Class	Excessively
Soil Manageability	
Class	3EPx
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	2
Forest Survey Site Class	5 to 7
Relative Chance of Seedling Survival	Very Low
AASHTO: Surface	A-4
AASHTO: Subsurface	
Unified: Surface	ML
Unified: Subsurface	
Inclusions:	10% Rock outcrop; Guemes family.

162 Lithic Xerumbrepts-Rock outcrop association, 15 to 90 percent slopes

Elevation: 4,600 to 6,800 feet Annual Precipitation: 50 to 100 inches

	Lithic Xerumbrepts	Rock Outcrop
Soil Map Unit Components		
Approximate Proportion	50%	40%
Landscape Position	Mountain sideslopes and ridges.	
Slope	30 to 90 percent	
Typical Vegetation	Pinemat manzanita, huckleberry oak, thinleaf huckleberry, ponderosa pine, white fir, incense cedar, phlox, sunflower, pink family, Adders Tongue, stonecrop.	

Soil Profile Description

Surface Layer	0-6 inches. Very dark grayish brown gravelly sandy loam; weak very fine granular structure; medium acid.
Subsoil	6-11 inches. Brown very gravelly loamy sand; massive; medium acid.
Substratum or Parent Material	11+ inches. Hard granitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Hard granitic rock.	
Available Water Capacity		
Total	0.6-0.9	
Upper 20 inches	0.8	
Infiltration Rate	Moderately Rapid	
Hydrologic Soil Group	B	
Permeability Class	Moderately Rapid to Rapid	
Erosion Hazard, Maximum	High	
Erosion Factor (K)	.02	
Drainage Class	Excessively	
Soil Manageability		
Class	4EPX	
Group	IV	
Range Type	Browse-Mtn Shrub (5)	Waste & Barren (7)
Range Site	VI	none
Annual Forage (lb/acre)	100-300	2
Forest Survey Site Class	5 to 6	
Relative Chance of Seedling Survival	Low to Very Low	
AASHTO: Surface	A-2-4	
Subsurface	A-2-4	
Unified: Surface	SM	
Subsurface	SM	
Inclusions:	10% Entic Xerumbrepts on colluvial footslopes.	

163 Merkel family, 2 to 30 percent slopes

Elevation: 5,000 to 6,800 feet Annual Precipitation: 40 to 55 inches

Soil Map Unit Components	**Merkel family**
Approximate Proportion	75%
Landscape Position	Ground moraines.
Slope	2 to 30 percent
Typical Vegetation	White fir, Jeffrey pine, western white pine, huckleberry oak, greenleaf manzanita, western serviceberry, phlox, yarrow, sedge, bottlebrush squirreltail.

Soil Profile Description

Surface Layer	0-10 inches. Brown very gravelly loam; moderate fine granular structure; neutral.
Subsoil	10-22 inches. Brown very cobbly loam; moderate fine subangular blocky structure; neutral.
Substratum or Parent Material	22-60+ inches. Yellowish brown very cobbly sandy loam; massive; mildly alkaline.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in ultramafic till.
Available Water Capacity	
Total	4.0
Upper 20 inches	2.0
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderate
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	3Xep
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	4
Relative Chance of Seedling Survival	Low to Moderate
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML
Subsurface	ML
Inclusions:	25% Boulder fields, glacier scoured rock.

164 Morical-Worley families association, 2 to 50 percent slopes

Elevation: 3,500 to 5,000 feet Annual Precipitation: 30 to 40 inches

Soil Map Unit Components	Morical family	Worley family
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Footslopes and undulating flats.
Slope	30 to 50 percent	2 to 30 percent
Typical Vegetation	Ponderosa pine, incense cedar, Douglas-fir, squaw carpet, greenleaf manzanita, deerbrush, lupine, bottlebrush, squirreltail.	Ponderosa pine, incense cedar, white oak, greenleaf and whiteleaf manzanita, rabbitbrush, western mountain mahogany, silktassel, buckbrush, dogbane, lupine, fescue.

Soil Profile Description

Surface Layer	0-8 inches. Grayish brown gravelly sandy loam; moderate fine and very fine granular structure; neutral.	0-8 inches. Brown loam; moderate fine granular structure; mildly alkaline.
Subsoil	8-25 inches. Light yellowish brown sandy clay loam; weak fine angular blocky structure; slightly acid.	8-60+ inches. Yellowish brown clay; strong coarse subangular blocky structure; slightly acid.
Substratum or Parent Material	25+ inches. Soft weathered gabbro.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Soft, weathered gabbro.	Greater than 60 inches. Soft weathered gabbro.
Available Water Capacity		
Total	2.7-8.3	9.1
Upper 20 inches	2.3	2.2
Infiltration Rate	Rapid	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderately Slow to Moderate	Moderately Slow to Slow
Erosion Hazard, Maximum	Moderate to High	Moderate
Erosion Factor (K)	.10	.20
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	2e
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3 to 4	2
Relative Chance of Seedling Survival	Moderate to Low	Moderate
AASHTO: Surface	A-2-4	A-4
Subsurface	A-6	A-7
Unified: Surface	SM	ML-CL
Subsurface	SC	CH
Inclusions:	10% Soils similar to Morical without a dark surface; soils similar to Worley with more rock fragments in the subsoil.	

165 Nanny family, 2 to 30 percent slopes.

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 90 inches

Soil Map Unit Components	**Nanny family**
Approximate Proportion	85%
Landscape Position	Ground moraines.
Slope	2 to 30 percent
Typical Vegetation	Douglas-fir, red fir, white fir, pinemat and greenleaf manzanita, snowbrush, Oregon grape, bittercherry.

Soil Profile Description

Surface Layer	0-12 inches. Dark brown very gravelly sandy loam; weak very fine granular structure; medium acid.
Subsoil	12-46 inches. Very pale brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	46+ inches. Glacial till.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in glacial till.
Available Water Capacity	
Total	3.0
Upper 20 inches	1.7
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	2epx
Group	II
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	4
Relative Chance of Seedling Survival	Low to Very Low
AASHTO: Surface	A-2-4
Subsurface	A-2-4
Unified: Surface	SM
Subsurface	SM
Inclusions:	15% Rock outcrop; soils with greater amounts of clay and lacking a dark surface horizon; very poorly drained soils in wet areas.

166 Nanny family, 30 to 50 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 90 inches.

Soil Map Unit Components	**Nanny family**
Approximate Proportion	90%
Landscape Position	Ground moraines.
Slope	30-50 percent
Typical Vegetation	White fir, red fir, Douglas-fir, pinemat and greenleaf manzanita, Oregon grape, bittercherry.

Soil Profile Description

Surface Layer	0-12 inches. Dark brown very gravelly sandy loam; weak very fine granular structure; medium acid.
Subsoil	12-46 inches. Very pale brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	46+ inches. Glacial till.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Greater than 60 inches in glacial till.
Available Water Capacity	
Total	3.0
Upper 20 inches	1.7
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	3Epx
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	3
Relative Chance of Seedling Survival	Low to Very Low
AASHTO: Surface	A-2-4
Subsurface	A-2-4
Unified: Surface	SM
Subsurface	SM
Inclusions:	10% Rock outcrop, and soils with greater amounts of clay and lacking a dark surface horizon.

167 Neuske-Etchen families complex, 2 to 9 percent slopes

Elevation: 4,600 to 5,500 feet Annual Precipitation: 12 to 20 inches.

Soil Map Unit Components	Neuske family	Etchen family
Approximate Proportion	65%	20%
Landscape Position	Mountain footslopes and structural benches.	Mountain footslopes, terraces and glacial outwash deposits.
Slope	2 to 9 percent	2 to 9 percent
Typical Vegetation	Mostly ponderosa pine, with juniper, rubber rabbitbrush, cheatgrass, bluegrass, Idaho fescue.	Mostly ponderosa pine, with juniper, rubber rabbitbrush, cheatgrass, bluegrass, Idaho fescue.

Soil Profile Description

Surface Layer	0-8 inches. Brown loam; very weak very fine granular structure; slightly acid.	0-9 inches. Light brownish gray sandy loam; moderate medium platy structure; neutral.
Subsoil	8-27 inches. Brown loam; moderate fine and medium subangular blocky structure; slightly acid.	9-40 inches. Pale brown extremely gravelly loam; moderate coarse subangular blocky structure; slightly acid.
Substratum or Parent Material	27-45+ inches. Yellowish brown loam; weak medium subangular blocky structure; slightly acid.	40+ inches. Hard fractured andesite and basalt.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured andesite and basalt.	40-60 inches. Fractured andesite and basalt.
Available Water Capacity		
Total	5.6-8.4	3.2-4.0
Upper 20 inches	2.8	2.6
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderate	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.24	.28
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	2ep
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	III	III
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	5 to 7	7
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-2-6
Unified: Surface	ML	SM
Subsurface	ML-CL	SC

Inclusions: 15% Soils similar to Neuske and Etchen families, except they either: have a very low bulk density; have a high base saturation; or lack a dark surface horizon.

168 Olete family-Lithic Ruptic-Xerochreptic Haploxeralfs association, 30 to 90 percent slopes

Elevation: 1,500 to 5,000 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	Olete family	Lithic RupticXerochreptic Haploxeralfs
Approximate Proportion	55%	30%
Landscape Position	Mountain sideslopes and colluvial footslopes.	Mountain sideslopes.
Slope	30 to 70 percent	50 to 90 percent
Typical Vegetation	Huckleberry oak, pinemat manzanita, California bay, silktassel, coffeeberry, Jeffrey pine, incense cedar, Douglasfir.	Jeffrey pine, incense cedar, Douglas-fir, whiteleaf manzanita huckleberry oak, buckbrush, silktassel, madrone.

Soil Profile Description

Surface Layer	0-3 inches. Strong brown very gravelly loam; moderate fine granular structure; strongly acid.	0-1 inches. Reddish brown loam; moderate very fine granular structure; medium acid.
Subsoil	3-40 inches. Reddish yellow very gravelly loam; moderate fine subangular blocky structure; strongly to medium acid.	1-17 inches. Red clay loam; moderate medium subangular blocky structure; medium acid.
Substratum or Parent Material	40-60 inches. Yellow very gravelly loam; massive; slightly acid.	17+ inches. Hard peridotite bedrock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Hard fractured peridotite.	Less than 20 inches. Hard peridotite bedrock.
Available Water Capacity		
Total	3.0-4.0	1.9
Upper 20 inches	1.3	1.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.20
Drainage Class	Somewhat Excessively	Well
Soil Manageability		
Class	3Epx	4Epx
Group	III	IV
Range Type	Browse-Mtn Shrub (5) and Chaparral	Conifer (6)
Range Site	V	IX
Annual Forage (lb/acre)	100-300	150-550
Forest Survey Site Class	4	5
Relative Chance of Seedling Survival	Low to Moderate	Very Low
AASHTO: Surface	A-4	A-4
Subsurface		A-6
Unified: Surface	ML-CL	ML
Subsurface		CL
Inclusions:	15% Talus and rock outcrop; Guemes family on colluvial slopes.	

169 Oosen-Avis families complex, 2 to 15 percent slopes

Elevation: 4,800 to 6,000 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	Oosen family	Avis family
Approximate Proportion	65%	20%
Landscape Position	Mountain footslopes and flats.	Mountain sideslopes, flats and lava flow ridges.
Slope	2 to 9 percent	2 to 15 percent
Typical Vegetation	Ponderosa pine, white fir, greenleaf manzanita, lodgepole pine, red fir, snowbrush, squaw carpet.	Ponderosa pine, white fir, greenleaf manzanita.

Soil Profile Description

Surface Layer	0-11 inches. Light yellowish brown sandy loam; weak very fine granular structure; neutral.	0-6 inches. Very dark grayish brown sand; single grain; slightly acid.
Subsoil		
Substratum or Parent Material	11-71+ inches. Pale brown to light brownish gray loamy sand; weak medium subangular blocky structure to massive; neutral.	6-61+ inches. Yellowish brown very cobbly coarse sand; massive; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	60+ inches. Fractured basalt and andesite.	60+ inches. Fractured basalt and andesite.
Available Water Capacity		
Total	5.4	1.5
Upper 20 inches	1.7	0.8
Infiltration Rate	Moderately Rapid	Very Rapid
Hydrologic Soil Group	A	A
Permeability Class	Moderately Rapid to Rapid	Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.24	.24
Drainage Class	Somewhat Excessively	Somewhat Excessively
Soil Manageability		
Class	2ep	3Pe
Group	II	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4	5
Relative Chance of Seedling Survival	Moderate	Very Low
AASHTO: Surface	A-2-4	A-3
Subsurface	A-2-4	A-1
Unified: Surface	SM	SP
Subsurface	SP-SM	

Inclusions: 15% Andic Xerumbrepts, soils with a clay increase in the subsoil.

170 Ovall family-Entic Xerumbrepts-Zeibright family association, 30 to 70 percent slopes.

Elevation: 1,500 to 5,000 feet Annual Precipitation: 35 to 50 inches

Map Unit Components	Ovall family	Entic Xerumbrepts	Zeibright family
Approx. Proportion	45%	25%	20%
Landscape Position	Mountain sideslopes and footslopes.	Mountain sideslopes especially upper slopes and ridgetops.	Mountain sideslopes and ridges.
Slope	30 to 50 percent	30 to 70 percent	30 to 70 percent
Typical Vegetation	Douglas-fir, ponderosa pine, madrone, black oak, chinquapin, greenleaf manzanita, incense cedar.	Douglas-fir, ponderosa pine, white fir, black oak, greenleaf manzanita, chinquapin, snowbrush, incense cedar.	Douglas-fir, ponderosa pine, white fir, incense cedar, greenleaf manzanita, black oak, chinquapin, snowbrush.
Soil Profile Description			
Surface Layer	0-10 inches. Brown sandy loam; weak very fine granular structure; slightly acid.	0-5 inches. Very dark grayish brown gravelly sandy loam; moderate very fine granular structure; medium acid.	0-7 inches. Dark grayish brown gravelly loam; weak fine granular structure; slightly acid.
Subsoil	10-18 inches. Yellowish brown sandy loam; weak coarse subangular blocky structure; slightly acid.	5-14+ inches. Pale brown gravelly loamy sand; weak fine granular structure; medium acid.	
Substratum or Parent Material	18-43 inches. Soft weathered granitic rock.	14+ inches. Soft weathered granitic rock.	7-30 inches. Yellowish brown very gravelly loamy coarse sand; weak fine granular structure; medium acid.
Soil Qualities and Management Interpretations			
Soil Depth and Parent Material	40-60 inches. Soft, weathered granitic rock.	Less than 20 inches. Weathered granitic rock.	20-40 inches. Soft, weathered granitic rock.
Available Water Capacity			
Total	3.5-4.9	0.8-1.2	1.0-1.4
Upper 20 inches	2.0	1.0	1.1
Infiltration Rate	Moderately Rapid	Rapid	Moderate
Hydrologic Soil Group	B	B	B
Permeability Class	Moderate to Moderately Rapid	Moderate to Rapid	Moderate to Moderately Rapid
Max. Erosion Hazard	Moderately High	Moderately High	High
Erosion Factor (K)	.17	.10	.15
Drainage Class	Well	Well to Excessively	Well
Soil Manageability			
Class	3epx	3Pex	3EPx
Group	III	III	III
Range Type	Conifer (6)	Conifer (6)	Conifer (6)
Range Site	IX	IX	IX
Annual Forage (lb/acre)	250-750	150-550	150-550
Survey Site Class	3 to 4	5	4 to 5
Relative Chance of Seedling Survival	Low	Low to Very Low	Low to Very Low
AASHTO: Surface	A-2-4	A-2-4	A-4
Subsurface	A-2-4	A-2-4	A-2-4
Unified: Surface	SM	SM	ML
Subsurface	SM	SM	SM
Inclusions:	10% Rock outcrop; Lithic Xerumbrepts; Rogue family; Jayar family.		

171 Parks family-Lithic Ruptic-Xerochreptic Haploxeralfs association, 30 to 90 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 70 to 100 inches

Soil Map Unit Components	Parks family	Lithic RupticXerochreptic Haploxeralfs
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	30 to 70 percent	50 to 90 percent
Typical Vegetation	Western white pine, white fir, red fir, incense cedar, pinemat manzanita, currant.	Huckleberry oak, silktassel, coffeeberry, squaw carpet, greenleaf and pinemat manzanita, Jeffrey pine, incense cedar, beargrass.

Soil Profile Description

Surface Layer	0-7 inches. Yellowish red gravelly fine sandy loam; moderate very fine and fine granular structure; neutral.	0-1 inches. Reddish brown loam; moderate very fine granular structure; medium acid.
Subsoil	7-33 inches. Yellowish red gravelly fine sandy loam; weak moderate and coarse subangular blocky structure; neutral.	1-17 inches. Red clay loam; moderate medium subangular blocky structure; medium acid.
Substratum or Parent Material	33-37 inches. Strong brown very gravelly fine sandy loam; massive; neutral.	17+ inches. Hard peridotite rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Soft, weathered peridotite.	10-20 inches. Hard, peridotite bedrock.
Available Water Capacity		
Total	1.8-3.4	1.9
Upper 20 inches	1.3	1.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderate to Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate to High	High
Erosion Factor (K)	.24	.20
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	4Epx
Group	III	IV
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	V
Annual Forage (lb/acre)	150-550	100-300
Forest Survey Site Class	4 to 5	5 to 6
Relative Chance of Seedling Survival	Low to Moderate	Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-6
Unified: Surface	SM	ML
Subsurface	SM	CL
Inclusions:	10% Talus and rock outcrop; Lithic Xerorthents, cold.	

172 Quam family, 0 to 5 percent slopes

Elevation: 4,500 to 5,500 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	**Quam family**
Approximate Proportion	80%
Landscape Position	Basins, low terraces and fan positions.
Slope	0 to 5 percent
Typical Vegetation	Sedges, rushes and other water loving plants.

Soil Profile Description

Surface Layer	0-21 inches. Gray loam; moderate medium platy structure; medium acid.
Subsoil	
Substratum or Parent Material	21-60 inches. Light brownish gray silt loam; moderate medium subangular blocky structure; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40+ inches. Mixed alluvium.
Available Water Capacity	
Total	6.4-9.6
Upper 20 inches	3.0
Infiltration Rate	Moderate
Hydrologic Soil Group	D
Permeability Class	Moderately Slow to Moderate
Erosion Hazard, Maximum	High
Erosion Factor (K)	.32
Drainage Class	Somewhat Poorly to Very Poorly
Soil Manageability	
Class	3EW
Group	III
Range Type	Meadow (2)
Range Site	I
Annual Forage (lb/acre)	760-1,200
Forest Survey Site Class	5 to 6
Relative Chance of Seedling Survival	Low
AASHTO: Surface	A-4
Subsurface	A-4
Unified: Surface	ML-CL
Subsurface	ML-CL
Inclusions:	20% Moderately well or well drained soils with a thick dark surface horizon and a clay increase in the subsoil.

173 Redcap-Stonewell families association 2 to 30 percent slopes

Elevation: 5,400 to 6,700 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	Redcap family	Stonewell family
Approximate Proportion	60%	25%
Landscape Position	Volcanic mountain footslopes, flats and basins.	Volcanic mountain footslopes, flats and basins.
Slope	2 to 30 percent	2 to 9 percent
Typical Vegetation	Lodgepole pine, red fir, pinemat manzanita, carex.	Lodgepole pine, white fir, red fir, greenleaf manzanita, snowbrush, rabbitbrush, bitterbrush, squaw carpet, stipa, bottlebrush squirreltail.

Soil Profile Description

Surface Layer	0-2 inches. Grayish brown gravelly coarse sand; single grain; medium acid.	0-4 inches. Light grayish brown very gravelly loamy coarse sand; single grain; strongly acid.
Subsoil	2-55 inches. Light gray to white gravelly to very gravelly coarse sand to loamy sand, ash and pumice over yellowish brown extremely cobbly sandy loam; weak fine subangular blocky structure; slightly acid.	
Substratum or Parent Material	55+ inches. Fractured, mixed igneous rocks.	4-60 inches. Light gray extremely gravelly loamy coarse sand; single grain; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	55+ inches. Weathered extrusive igneous rock.	60+ inches. Black cinders.
Available Water Capacity		
Total	2.2	1.2
Upper 20 inches	0.8	0.7
Infiltration Rate	Very Rapid	Very Rapid
Hydrologic Soil Group	A	B
Permeability Class	Moderately Rapid to Rapid	Rapid to Very Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.10	.10
Drainage Class	Somewhat Excessively to Excessively	Excessively
Soil Manageability		
Class	3Pex	3Pex
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4	5
Relative Chance of Seedling Survival	Very Low	Very Low
AASHTO: Surface	A-1	A-4
Subsurface	A-2-4	A-4
Unified: Surface	SP, GW	ML
Subsurface	SM	ML
Inclusions:	15% soils similar to Redcap with pumice overburden; rock outcrop.	

174 Riverwash

Elevation: 700 to 2,000 feet Annual Precipitation: 30 to 60 inches

Soil Map Unit Components	**Riverwash deposits**
Approximate Proportion	65%
Landscape Position	Stream channels.
Slope	
Typical Vegetation	Mostly bare, with scattered riparian vegetation.

Soil Profile Description

Sand, gravels, cobbles and stones on nearly level to moderately sloping terrain adjacent to rivers and streams.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material		Mixed alluvium.
Available Water Capacity		
Total		
Upper 20 inches		
Infiltration Rate		Very Rapid
Hydrologic Soil Group		A
Permeability Class		Very Rapid
Erosion Hazard, Maximum		
Erosion Factor (K)		
Drainage Class		
Soil Manageability		
Class		
Group		
Range Type		Water (7)
Range Site		none
Annual Forage (lb/acre)		2
Forest Survey Site Class		
Relative Chance of Seedling Survival		
AASHTO:	Surface	A-1
	Subsurface	A-1
Unified:	Surface	GP, GW
	Subsurface	GM or GC
Inclusions:		35% Soils formed in recent water deposited sediments are present on floodplains and alluvial fan footslopes; soils with a slight or moderate clay increase in the subsoil are present on terraces.

175 Rock outcrop-Teewinot family association, 50 to 90 percent slopes

Elevation: 6,200 to 8,500 feet Annual Precipitation: 60 to 110 inches

Soil Map Unit Components	Rock outcrop	Teewinot family
Approximate Proportion	60%	30%
Landscape Position	Ridges, cliffs and peaks.	Mountain sideslopes and ridges.
Slope		50 to 90 percent
Typical Vegetation		Red fir, mountain hemlock, western white pine, pinemat manzanita, brewer spruce, thinleaf huckleberry, phlox, rush, penstemon, sedum, sedge.

Soil Profile Description

Surface Layer	0-9 inches. Very dark gray extremely gravelly loam; weak very fine granular structure; very strongly acid.
Subsoil	
Substratum or Parent Material	9+ inches. Hard mafic plutonic or metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Mafic plutonic or metamorphic rock.	Less than 20 inches. Mafic, metamorphic rocks.
Available Water Capacity		
Total		1.0 Max.
Upper 20 inches		1.0
Infiltration Rate		Moderately Slow
Hydrologic Soil Group		D
Permeability Class		Moderate to Rapid
Erosion Hazard, Maximum		High
Erosion Factor (K)		.05
Drainage Class		Excessively
Soil Manageability		
Class		4EPX
Group		IV
Range Type	Waste and Barren (7)	Conifer (6)
Range Site		IX
Annual Forage (lb/acre)	2	150-550
Forest Survey Site Class		5 to 6
Relative Chance of Seedling Survival		Very Low
AASHTO: Surface		A-1
Subsurface		
Unified: Surface		GM,GC
Subsurface		

Inclusions: 10% Talus; soils similar to Teewinot family, lacking a dark surface horizon; Endlich family.

176 Rogue-Jayar families association, 30 to 50 percent slopes

Elevation: 4,800 to 6,500 feet Annual Precipitation: 50 to 60 inches

Soil Map Unit Components	Rogue family	Jayar family
Approximate Proportion	60%	20%
Landscape Position	Mountain sideslopes and ridges.	Mountain sideslopes.
Slope	30 to 50 percent	30 to 50 percent
Typical Vegetation	White fir, Douglas-fir, madrone, incense cedar, greenleaf manzanita, deerbrush, squaw carpet.	Ponderosa pine, white fir, Douglas-fir, red fir, snowberry, currant.

Soil Profile Description

Surface Layer	0-2 inches. Light olive brown loamy sand; weak very fine granular structure; slightly acid.	0-2 inches. Brown very gravelly loam; strong very fine and fine granular structure; slightly acid.
Subsoil	2-29 inches. Yellowish brown sandy loam; weak fine and medium subangular blocky structure; neutral.	2-24 inches. Yellowish brown very gravelly loam; moderate fine and very fine subangular blocky structure to massive; slightly acid.
Substratum or Parent Material	29+ inches. Weathered granitic rock.	24-34 inches. Pale yellow very gravelly sandy loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Weathered granitic rock.	20-60 inches. Weathered granitic rock.
Available Water Capacity		
Total	2.5-4.5	1.4-4.2
Upper 20 inches	1.9	1.8
Infiltration Rate	Moderately Rapid	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Rapid to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.15	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3epx
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	3 to 4	3 to 4
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-2-4	A-2-4
Unified: Surface	SM	ML
Subsurface	SM	SM

Inclusions: 20% Lithic Xerumbrepts; shallow soils similar to Rogue and Jayar; rock outcrop.

177 Ruclick-Cowiche families association, 2 to 9 percent slopes

Elevation: 4,200 to 4,600 feet Annual Precipitation: 9 to 12 inches

Soil Map Unit Components	Ruclick family	Cowiche family
Approximate Proportion	45%	40%
Landscape Position	Volcanic mountain sideslopes and lava flows.	Volcanic upland terraces and lava flows.
Slope	2 to 9 percent	2 to 9 percent
Typical Vegetation	Ponderosa pine, juniper, big sagebrush, rabbitbrush, bitterbrush, stipa, Idaho fescue, bottlebrush squirreltail.	Ponderosa pine, juniper, sagebrush, rabbitbrush, perennial grasses.

Soil Profile Description

Surface Layer	0-5 inches. Brown sandy loam; moderate coarse platy structure; slightly acid.	0-8 inches. Brown silt loam; moderate fine medium and coarse platy structure; slightly acid.
Subsoil	5-34 inches. Grayish brown stony sandy clay loam; moderate medium subangular blocky structure; neutral.	8-42 inches. Brown sandy clay loam; weak medium subangular blocky structure; neutral.
Substratum or Parent Material	34+ inches. Hard basaltic rock.	42+ inches. Hard andesitic and basaltic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Hard basaltic bedrock.	40-60 inches. Andesitic and basaltic bedrock.
Available Water Capacity		
Total	2.1-4.1	7.0-10.6
Upper 20 inches	2.1	2.9
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Slow to Moderately Slow	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.20	.37
Drainage Class	Well	Well
Soil Manageability		
Class	2epx	3Ex
Group	II	III
Range Type	Conifer (6)	Conifer (6)
Range Site	III	III
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	7	6
Relative Chance of Seedling Survival	Low	Very Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-7	A-2-6
Unified: Surface	SC	ML
Subsurface	CH	SC

Inclusions: 15% rock outcrop, soils that have a thick dark surface horizon that has a high amount of organic carbon.

178 Ruclick-Deven families complex, 0 to 9 percent slopes

Elevation: 4,200 to 4,800 feet Annual Precipitation: 9 to 12 inches

Soil Map Unit Components	Ruclick family	Deven family
Approximate Proportion	50%	30%
Landscape Position	Lava flows.	Lava flows.
Slope	0 to 5 percent	0 to 9 percent
Typical Vegetation	Juniper, big sagebrush, western mountain mahogany, rubber rabbitbrush.	Juniper, big sagebrush, western mountain mahogany, rubber rabbitbrush.

Soil Profile Description

Surface Layer	0-5 inches. Brown sandy loam; moderate coarse platy structure; slightly acid.	0-1 inch. Brown loamy sand; weak very fine granular structure; slightly acid.
Subsoil	5-34 inches. Grayish brown stony sandy clay loam; moderate medium subangular blocky structure; neutral.	1-15 inches. Dark grayish brown clay loam; moderate medium and fine subangular blocky structure; slightly acid.
Substratum or Parent Material	34+ inches. Hard basaltic rock.	15+ inches. Hard basaltic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Hard basaltic rock.	Less than 20 inches. Hard basaltic rock.
Available Water Capacity		
Total	2.1-4.1	2.5
Upper 20 inches	2.1	2.2
Infiltration Rate	Moderately Rapid	Moderately Rapid
Hydrologic Soil Group	C	D
Permeability Class	Slow to Moderately Slow	Moderately slow
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.20	.15
Drainage Class	Well	Well
Soil Manageability		
Class	2epx	3Epx
Group	II	III
Range Type	Juniper (9)	Juniper (9)
Range Site	IV	IV
Annual Forage (lb/acre)	250-600	250-600
Forest Survey Site Class	7	7
Relative Chance of Seedling Survival	Very Low	Very Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-7	A-7
Unified: Surface	SC	ML
Subsurface	CH	CH

Inclusions: 20% Rock outcrop, and soils with a thick dark surface horizon and a significant clay increase in the subsoil.

179 Ruclick-Deven families complex, 15 to 30 percent slopes

Elevation: 4,500 to 5,200 feet Annual Precipitation: 9 to 12 inches

Soil Map Unit Components	Ruclick family	Deven family
Approximate Proportion	60%	25%
Landscape Position	Volcanic mountain sideslopes.	Volcanic mountain sideslopes.
Slope	15 to 30 percent	15 to 30 percent
Typical Vegetation	Juniper, big sagebrush, western mountain mahogany, rubber rabbitbrush.	Juniper, big sagebrush, western mountain mahogany, rubber rabbitbrush.

Soil Profile Description

Surface Layer	0-5 inches. Brown sandy loam; moderate coarse platy structure; slightly acid.	0-1 inches. Brown loamy sand; weak very fine granular structure; slightly acid.
Subsoil	5-34 inches. Grayish brown stony sandy clay loam; moderate medium subangular blocky structure; neutral.	1-15 inches. Dark grayish brown clay loam; moderate medium and fine subangular blocky structure; slightly acid.
Substratum or Parent Material	34+ inches. Hard basaltic rock.	15+ inches. Hard basaltic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Hard basaltic rock.	Less than 20 inches. Hard basaltic rock.
Available Water Capacity		
Total	2.1-4.1	2.5
Upper 20 inches	2.1	2.2
Infiltration Rate	Moderately Rapid	Moderately Rapid
Hydrologic Soil Group	C	D
Permeability Class	Slow to Moderately Slow	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.20	.15
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3Epx
Group	III	III
Range Type	Juniper (9)	Juniper (9)
Range Site	IV	IV
Annual Forage (lb/acre)	250-600	250-600
Forest Survey Site Class	7	7
Relative Chance of Seedling Survival	Very Low	Very Low
AASHTO: Surface	A-2-4	A-4
Subsurface	A-7	A-7
Unified: Surface	SC	ML
Subsurface	CH	CH

Inclusions: 15% Rock outcrop; soils similar to Deven with more rock fragments; frigid soils in isolated areas.

180 Sheld-Iller families complex, 5 to 50 percent slopes

Elevation: 5,500 to 6,800 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	Sheld family	Iller family
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes and volcanic uplands.	Mountain sideslopes and volcanic uplands.
Slope	15 to 50 percent	5 to 30 percent
Typical Vegetation	Mainly white fir with red fir, Douglas-fir, ponderosa pine, snowbrush, chinquapin, squaw carpet, manzanita.	Mainly white fir with red fir, Douglas-fir, ponderosa pine, snowbrush, greenleaf manzanita, squaw carpet.

Soil Profile Description

Surface Layer	0-11 inches. Brown sandy loam; weak fine granular structure; strongly acid.	0-12 inches. Grayish brown sandy loam; weak medium granular structure; slightly acid.
Subsoil	11-34 inches. Reddish brown very stony fine sandy loam; weak medium subangular blocky structure; slightly acid.	12-60+ inches. Yellowish brown sandy loam; massive; slightly acid.
Substratum or Parent Material	34+ inches. Volcanic ash, colluvium, tuff or igneous rock.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Ash over colluvium, tuff, basalt.	60+ inches. Ash over colluvium, tuff, basalt.
Available Water Capacity		
Total	1.8-4.6	4.2
Upper 20 inches	1.4	2.0
Infiltration Rate	Moderately Rapid	Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.17	.15
Drainage Class	Well	Well
Soil Manageability		
Class	3epx	2epx
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4 to 5	4
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-2-4	A-2-4
Subsurface	A-4	A-2-4
Unified: Surface	SM	SM
Subsurface	SM	SM

Inclusions: 15% Rock outcrop, and soils with a thick dark surface horizon and a significant clay increase in the subsoil.

181 Sheld family-Lava flow complex, 30 to 70 percent slopes

Elevation: 5,000 to 6,800 feet Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	**Sheld family**	**Lava flows**
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes and lava flows.	
Slope	30 to 70 percent	
Typical Vegetation	Ponderosa pine, white fir, greenleaf manzanita, squaw carpet.	

Soil Profile Description

Surface Layer	0-11 inches. Brown sandy loam; weak fine granular structure; strongly acid.
Subsoil	11-34 inches. Reddish brown very stony fine sandy loam; weak medium subangular blocky structure; slightly acid.
Substratum or Parent Material	34+ inches. Hard fractured andesite.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Hard, fractured andesite.	
Available Water Capacity		
Total	3.0-4.4	
Upper 20 inches	1.4	
Infiltration Rate	Moderately Rapid	
Hydrologic Soil Group	B	
Permeability Class	Moderate to Rapid	
Erosion Hazard, Maximum	Moderate to High	
Erosion Factor (K)	.17	
Drainage Class	Well	
Soil Manageability		
Class	3EXp	
Group	III	
Range Type	Conifer (6)	Waste & Barren (7)
Range Site	IX	none
Annual Forage (lb/acre)	150-550	2
Forest Survey Site Class	4	
Relative Chance of Seedling Survival	Low	
AASHTO: Surface	A-2-4	
Subsurface	A-4	
Unified: Surface	SM	
Subsurface	SM	
Inclusions:	15% Soils similar to Sheld with fewer rock fragments; soils similar to Sheld without a dark surface horizon.	

182 Skalan-Clallam, deep families association, 30 to 70 percent slopes

Elevation: 1,500 to 4,800 feet Annual Precipitation: 45 to 65 inches

Soil Map Unit Components	Skalan family	Clallam family, deep
Approximate Proportion	70%	20%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	30 to 70 percent	30 to 70 percent
Typical Vegetation	Tanoak, madrone, bigleaf maple, Douglas-fir, sugar pine, thimbleberry, poison oak, snowberry, sword fern, twin flower.	Douglas-fir, sugar pine, tanoak, madrone, longleaf mahonia, modesty flower, deerbrush, bluegrass, bracken fern.

Soil Profile Description

Surface Layer	0-5 inches. Brown very gravelly loam; strong very fine crumb structure; medium acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil	5-26 inches. Light reddish brown very gravelly loam; weak medium subangular blocky structure to massive; slightly acid.	7-30 inches. Light yellowish brown very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	26-32 inches. Light yellowish brown very gravelly loam; massive; medium acid.	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Fractured metamorphic rock.	40-60 inches. Fractured metamorphic rock.
Available Water Capacity		
Total	1.6-3.2	3.3-5.1
Upper 20 inches	1.7	1.7
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3Epx
Group	III	III
Range Type	Broadleaf Trees (10)	Conifer (6)
Range Site	VI	IX
Annual Forage (lb/acre)	210-350	150-550
Forest Survey Site Class	3 to 4	3
Relative Chance of Seedling Survival	Moderate	Moderate
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	GM	GM
Subsurface	GM	GM
Inclusions:	10% Rock outcrop and Deadwood family.	

183 Skalan-Clallam, deep-Decy families association, 15 to 70 percent slopes

Elevation: 1,500 to 5,200 feet Annual Precipitation: 30 to 55 inches

Map Unit Components	Skalan family	Clallam family, deep	Decy family
Approx. Proportion	40%	25%	20%
Landscape Position	Mountain sideslopes and landslides.	Mountain sideslopes and landslide escarpments.	Mountain sideslopes and landslide benches.
Slope	15 to 50 percent	30 to 70 percent	30 to 70 percent
Typical Vegetation	Douglas-fir, ponderosa pine, incense cedar, sugar pine, white fir, black oak, madrone, deerbrush, white leaf and pinemat manzanita, vetch, snowberry, fescue.	Douglas-fir, ponderosa pine, sugar pine, incense cedar, white fir, black oak, live oak, madrone, deerbrush, white leaf manzanita, vetch, bedstraw.	Douglas-fir, white fir, incense cedar, ponderosa pine, sugar pine, madrone, black oak, deerbrush, white leaf manzanita, Oregon grape, snowberry.

Soil Profile Description

Surface Layer	0-5 inches. Brown very gravelly loam; strong very fine crumb structure; medium acid.	0-7 inches. Grayish brown very gravelly loam; strong very fine granular structure; slightly acid.	0-13 inches. Dark grayish brown very gravelly loam; weak fine granular structure; neutral.
Subsoil	5-26 inches. Light reddish brown very gravelly loam; weak medium subangular blocky structure to massive; slightly acid.	7-30 inches. Light yellowish brown very gravelly loam; weak fine subangular blocky structure; medium acid.	13-60+ inches. Light olive gray very stony loam; moderate medium subangular blocky structure; slightly acid.
Substratum or Parent Material	26-32 inches. Light yellowish brown very gravelly loam; massive; medium acid.	30-42 inches. Very pale brown very gravelly clay loam; massive; medium acid.	

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Highly fractured mica schist.	40-60 inches. Highly fractured mica schist.	40-60+ inches. Highly fractured mica schist.
Available Water Capacity			
Total	2.6-6.0	2.6-4.8	2.6-4.8
Upper 20 inches	1.7	1.7	1.3
Infiltration Rate	Moderate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	B	B
Permeability Class	Moderate	Moderate to Rapid	Moderate
Max. Erosion Hazard	High	Moderate	Moderate
Erosion Factor (K)	.37	.10	.10
Drainage Class	Well	Well	Well
Soil Manageability			
Class	3Epx	3epx	3epx
Group	III	III	III
Range Type	Conifer (6)	Conifer (6)	Conifer (6)
Range Site	IX	IX	IX
Annual Forage (lb/acre)	250-750	150-550	150-550
Survey Site Class	2 to 3	3 to 4	3 to 4
Seedling Survival	Moderate to Low	Moderate to Low	Moderate to Low
AASHTO: Surface	A-4	A-4	A-4
Subsurface	A-4	A-4	A-4
Unified: Surface	ML	ML	ML
Subsurface	ML	ML	ML

Inclusions: 15% Deadwood family; soils similar to Decy family with a thicker dark surface horizon; Holland family; rock outcrop.

184 Skalan family-Lithic Haploxeralfs association, 30 to 90 percent slopes

Elevation: 1,500 to 5,200 feet Annual Precipitation: 25 to 50 inches

Soil Map Unit Components	Skalan family	Lithic Haploxeralfs
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	30 to 70 percent	50 to 90 percent
Typical Vegetation	Douglas-fir, ponderosa pine, incense cedar, white fir, canyon live oak, bush chinquapin, greenleaf manzanita, Idaho fescue, stipa, bottlebrush squirreltail.	Ponderosa pine, Oregon white oak, buckbrush, greenleaf manzanita, Idaho fescue, bottlebrush squirreltail, cheatgrass, bracken fern, yerba santa, wild buckwheat.

Soil Profile Description

Surface Layer	0-5 inches. Brown very gravelly loam; strong very fine crumb structure; medium acid.	0-10 inches. Light yelllowish brown very gravelly loam; moderate very fine and fine subangular blocky structure; slightly acid.
Subsoil	5-26 inches. Light reddish brown very gravelly loam; weak medium subangular blocky structure to massive; slightly acid.	10-13 inches. Light yellowish brown very gravelly clay loam; moderate fine subangular blocky structure; neutral.
Substratum or Parent Material	26-32 inches. Light yellowish brown very gravelly loam; massive; medium acid.	13+ inches. Hard fractured metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Fractured metamorphic rock.	Less than 20 inches. Metasedimentary rock.
Available Water Capacity		
Total	1.6-3.2	1.8 Max.
Upper 20 inches	1.7	1.8
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	4epx
Group	III	IV
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	100-300
Forest Survey Site Class	4 to 5	5
Relative Chance of Seedling Survival	Low to Moderate	Low to Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-7
Unified: Surface	GM	GM
Subsurface	GM	SC,CL

Inclusions: 15% Lithic Mollic Haploxeralfs; Deadwood family; Clallam family; rock outcrop.

185 Skalan family-Lithic Mollic Haploxeralfs association, 30 to 70 percent slopes

Elevation: 2,500 to 4,800 feet Annual Precipitation: 30 to 40 inches

Soil Map Unit Components	Skalan family	Lithic Mollic Haploxeralfs
Approximate Proportion	50%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes and ridge tops.
Slope	30 to 50 percent	50 to 70 percent
Typical Vegetation	Mixed conifer forest with black oak, Oregon white oak, western mountain mahogany, whiteleaf manzanita, berberis, perennial grasses.	Mostly gravel covered bare ground with scattered Jeffrey pine, Douglas-fir, canyon live oak, greenleaf manzanita, silktassle, berberis.

Soil Profile Description

Surface Layer	0-5 inches. Brown very gravelly loam; strong very fine crumb structure; medium acid.	0-3 inches. Brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Subsoil	5-26 inches. Light reddish brown very gravelly loam; weak medium subangular blocky structure to massive; slightly acid.	3-14 inches. Brown very gravelly loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	26-32 inches. Light yellowish brown very gravelly loam; massive; medium acid.	14+ inches. Hard, fractured metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Fractured metamorphic rock.	Less than 20 inches. Metamorphic rock.
Available Water Capacity		
Total	1.6-3.2	1.5 Max.
Upper 20 inches	1.7	1.5
Infiltration Rate	Moderate	Moderately Rapid to Rapid
Hydrologic Soil Group	B	C
Permeability Class	Moderately Slow to Moderately Rapid	Moderately Slow to Moderate
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Ep	3Ep
Group	III	III
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	VI
Annual Forage (lb/acre)	250-750	100-300
Forest Survey Site Class	4 to 5	5
Relative Chance of Seedling Survival	Low to Moderate	Low to Very Low
AASHTO: Surface	A-4	A-1
Subsurface	A-4	A-4
Unified: Surface	GM	GM,SM
Subsurface	GM	GM
Inclusions:	20% Bluesprin family; Holland family; Deadwood family.	

186 Tallac-Nanny families association, 9 to 30 percent slopes

Elevation: 5,200 to 6,200 feet Annual Precipitation: 40 to 90 inches

Soil Map Unit Components	Tallac family	Nanny family
Approximate Proportion	70%	25%
Landscape Position	Ground moraines.	Lateral moraines.
Slope	9 to 30 percent	9 to 30 percent
Typical Vegetation	Alders, willows, forbs, grasses and scattered red fir and white fir.	Grasses, forbs, shrubs, few red fir, white fir, Douglas-fir.

Soil Profile Description

Surface Layer	0-3 inches. Very dark grayish brown loam; weak fine granular structure; medium acid.	0-12 inches. Dark brown very gravelly sandy loam; weak very fine granular structure; medium acid.
Subsoil	3-25 inches. Dark brown sandy loam; weak medium granular structure; slightly acid.	12-46 inches. Very pale brown very gravelly sandy loam; weak fine subangular blocky structure; medium acid.
Substratum or Parent Material	25+ inches. Glacial till.	46+ inches. Glacial till.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches in glacial till.	Greater than 60 inches in glacial till.
Available Water Capacity		
Total	2.6-6.7	3.0
Upper 20 inches	1.4	1.7
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Moderately Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.20	.10
Drainage Class	Well	Well
Soil Manageability		
Class	2epx	3Pex
Group	II	III
Range Type	Perennial Forbs (3)	Meadow (2)
Range Site	II & VIII	II
Annual Forage (lb/acre)	125-400	760-1,200
Forest Survey Site Class	3	4
Relative Chance of Seedling Survival	Low	Low to Very Low
AASHTO: Surface	A-4	A-2-4
Subsurface	A-2-4	A-2-4
Unified: Surface	ML	SM
Subsurface	SM	SM
Inclusions:	5% Rock outcrop.	

187 Tallac family-Ultic Haploxeralfs association, 15 to 50 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 55 to 70 inches

Soil Map Unit Components	Tallac family	Ultic Haploxeralfs
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes and ridges.	Broad mountain sideslopes and landslide benches.
Slope	15 to 50 percent	15 to 30 percent
Typical Vegetation	White fir, incense cedar, red fir, Douglas-fir, currant, snowberry, lupine, bedstraw, perennial grasses.	White fir, red fir, incense cedar, Douglasfir, currant, willow, snowberry, chinquapin, lupine, penstemon, pussy paws, vetch, annual and perennial grasses.

Soil Profile Description

Surface Layer	0-3 inches. Very dark grayish brown loam; weak fine granular structure; medium acid.	0-2 inches. Yellowish brown gravelly loam; moderate fine granular structure; slightly acid.
Subsoil	3-25 inches. Dark brown sandy loam; weak medium granular structure; slightly acid.	2-35 inches. Brown gravelly loam; moderate fine subangular blocky structure; slightly acid.
Substratum or Parent Material	25+ inches. Hard highly fractured mica schist.	35+ inches. Highly fractured mica schist.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Highly fractured mica schist.	20-60 inches. Highly fractured mica schist.
Available Water Capacity		
Total	4.3-6.1	2.4-4.0
Upper 20 inches	1.4	1.4
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	Moderate
Erosion Factor (K)	.28	.24
Drainage Class	Well	Well
Soil Manageability		
Class	3epx	2epx
Group	III	II
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	2 to 3	3 to 4
Relative Chance of Seedling Survival	Low	Moderate to Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	ML	ML
Subsurface	ML	ML

Inclusions: 15% Wet areas and meadows; Nanny family; rock outcrop.

188 Tangle family, 15 to 50 percent slopes.

Elevation: 4,800 to 6,800 feet Annual Precipitation: 45 to 60 inches

Soil Map Unit Components	**Tangle family**
Approximate Proportion	75%
Landscape Position	Mountain sideslopes and landslide benches.
Slope	15 to 50 percent
Typical Vegetation	Mixed conifer forest, Jeffrey pine, huckleberry oak, beargrass.

Soil Profile Description

Surface Layer	0-6 inches. Dark brown very gravelly sandy loam; weak very fine granular structure; medium acid.
Subsoil	6-57 inches. Pale brown very cobbly sandy loam; moderate medium subangular blocky structure; slightly acid.
Substratum or Parent Material	57+ inches. Hard highly fractured serpentinitic peridotite.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured serpentinitic peridotite.
Available Water Capacity	
Total	1.6-5.2
Upper 20 inches	1.1
Infiltration Rate	Moderately Rapid
Hydrologic Soil Group	B
Permeability Class	Slow to Very Slow
Erosion Hazard, Maximum	Moderate to High
Erosion Factor (K)	.10
Drainage Class	Well
Soil Manageability	
Class	3Epx
Group	III
Range Type	Conifer (6)
Range Site	IX
Annual Forage (lb/acre)	250-750
Forest Survey Site Class	3 to 4
Relative Chance of Seedling Survival	Low to Moderate
AASHTO: Surface	A-2-4
Subsurface	A-7
Unified: Surface	SC
Subsurface	CH
Inclusions:	25% Toadlake family; Lithic Argixerolls; rock outcrop; boulder and stone fields; organic soils in wet meadows on landslide benches.

189 Teewinot-Endlich families association, 30 to 90 percent slopes

Elevation: 6,200 to 8,300 feet Annual Precipitation: 60 to 90 inches

Soil Map Unit Components	Teewinot family	Endlich family
Approximate Proportion	50%	30%
Landscape Position	Upper mountain sideslopes and ridges.	Mountain sideslopes and footslopes.
Slope	50 to 90 percent	30 to 70 percent
Typical Vegetation	Red fir, mountain hemlock, western white pine, pinemat manzanita.	Red fir, mountain hemlock, western white pine, pinemat manzanita.

Soil Profile Description

Surface Layer	0-9 inches. Very dark gray extremely gravelly loam; weak very fine granular structure; very strongly acid.	0-4 inches. Dark brown loam; weak medium granular structure; extremely acid.
Subsoil		4-21 inches. Yellowish brown very gravelly to extremely gravelly cobbly loam; weak fine granular structure; very strongly acid.
Substratum or Parent Material	9+ inches. Hard granitic rock.	21-48 inches. Light yellowish brown extremely cobbly loamy fine sand; massive; very strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Hard granitic rock.	Greater than 60 inches. Weathered granitic rock.
Available Water Capacity		
Total	0.4-0.8	3.0
Upper 20 inches	1.0	1.3
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderate to Rapid	Moderate to Moderately Rapid
Erosion Hazard, Maximum	Very High	High
Erosion Factor (K)	.05	.32
Drainage Class	Excessively	Well
Soil Manageability		
Class	4EPx	3EPx
Group	IV	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	2	150-550
Forest Survey Site Class	5 to 7	4
Relative Chance of Seedling Survival	Very Low	Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	ML	ML
Subsurface	ML	SM

Inclusions: 20% Deeper soils similar to Teewinot family; shallow soils similar to Endlich family; rock outcrop; wet areas and meadows.

190 Teewinot family-Rock outcrop association, 50 to 90 percent slopes

Elevation: 6,200 to 8,500 feet Annual Precipitation: 80 to 110 inches

	Teewinot family	Rock outcrop
Soil Map Unit Components		
Approximate Proportion	60%	15%
Landscape Position	Mountain sideslopes and ridges.	Ridges and cliffs.
Slope	50 to 90 percent	
Typical Vegetation	Red fir, mountain hemlock, western white pine, pinemat manzanita, brewer spruce, thinleaf huckleberry, phlox, rush, penstemon, sedum, sedge.	

Soil Profile Description

Surface Layer	0-9 inches. Very dark gray extremely gravelly loam; weak very fine granular structure; very strongly acid.
Subsoil	
Substratum or Parent Material	9+ inches. Hard mafic or metamorphic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Mafic, metamorphic rock.		
Available Water Capacity			
Total	1.0 Max.		
Upper 20 inches	1.0		
Infiltration Rate	Moderately Slow		
Hydrologic Soil Group	D		
Permeability Class	Moderate to Rapid		
Erosion Hazard, Maximum	High		
Erosion Factor (K)	.05		
Drainage Class	Excessively		
Soil Manageability			
Class	4EPx		
Group	IV		
Range Type	Conifer (6)	Waste & Barren (7)	
Range Site	IX	none	
Annual Forage (lb/acre)	150-550	2	
Forest Survey Site Class	5 to 6		
Relative Chance of Seedling Survival	Very Low		
AASHTO: Surface	A-1		
Subsurface			
Unified: Surface	GM,GC		
Subsurface			
Inclusions:	25% Endlich family and deeper soils similar to Teewinot.		

191 Toadlake family-Lithic Argixerolls association, 30 to 70 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 50 to 60 inches

Soil Map Unit Components	Toadlake family	Lithic Argixerolls
Approximate Proportion	45%	30%
Landscape Position	Colluvial footslopes.	Mountain sideslopes.
Slope	30 to 70 percent	30 to 70 percent
Typical Vegetation	Jeffrey pine, white fir, western white pine, huckleberry oak, pinemat and greenleaf manzanita.	Gravel pavement surface with buckwheat, phlox, grasses, Jeffrey pine, western white pine.

Soil Profile Description

Surface Layer	0-3 inches. Brown gravelly loam; moderate fine granular structure; slightly acid.	0-5 inches. Brown very gravelly sandy clay loam; weak fine granular structure; neutral.
Subsoil	3-41 inches. Yellowish brown very gravelly clay loam; weak fine and medium granular structure; slightly acid.	5-14 inches. Brown very gravelly silty clay loam; weak to moderate fine subangular blocky structure; neutral.
Substratum or Parent Material	41+ inches. Serpentinitic colluvium.	14+ inches. Hard, highly fractured serpentinite.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Serpentinitic colluvium.	Less than 20 inches. Fractured serpentinite.
Available Water Capacity		
Total	3.7-5.5	1.9
Upper 20 inches	1.8	1.9
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	C
Permeability Class	Moderate to Moderately Slow	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.17	.05
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	3Epx	3Epx
Group	III	III
Range Type	Conifer (6)	Perennial (3) Forbs
Range Site	IX	VIII
Annual Forage (lb/acre)	150-550	75-200
Forest Survey Site Class	4	5 to 7
Relative Chance of Seedling Survival	Moderate to Low	Low
AASHTO: Surface	A-4	A-2-6
Subsurface	A-6	A-7
Unified: Surface	ML-CL	SC
Subsurface	ML-CL	ML-CL

Inclusions: 25% Rock outcrop, talus; soils similar to Lithic Argixerolls without a clay increase in the subsoil.

192 Trojan-Kilmerque families association, 2 to 9 percent slopes

Elevation: 4,600 to 5,000 feet Annual Precipitation: 15 to 25 inches

Soil Map Unit Components	Trojan family	Kilmerque family
Approximate Proportion	55%	20%
Landscape Position	Terraces and fans.	Volcanic terraces and fans.
Slope	2 to 9 percent	2 to 9 percent
Typical Vegetation	Scattered ponderosa pine with sagebrush understory and bottlebrush squirreltail.	Scattered ponderosa pine with sagebrush understory.

Soil Profile Description

Surface Layer	0-11 inches. Brown loam; weak very fine granular structure; slightly acid.	0-1 inch. Grayish brown sandy loam; weak fine granular structure; medium acid.
Subsoil	11-58 inches. Pale brown loam; moderate medium subangular blocky structure; slightly acid.	1-15 inches. Grayish brown loamy sand; weak medium subangular blocky structure; neutral.
Substratum or Parent Material	58+ inches. Hard, slightly fractured basalt.	15-63 inches. Pale brown loamy sand; massive; neutral.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches. Fractured basalt.	40-60+ inches. Fractured basalt or andesite.
Available Water Capacity		
Total	8.1	3.4
Upper 20 inches	2.8	1.4
Infiltration Rate	Moderate	Moderately Rapid
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderate	Moderately Rapid to Rapid
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.28	.05
Drainage Class	Well	Well
Soil Manageability		
Class	3E	2ep
Group	III	II
Range Type	Perennial Grasslands (1)	Perennial Grasslands (1)
Range Site	III	III
Annual Forage (lb/acre)	500-800	500-800
Forest Survey Site Class	4	5
Relative Chance of Seedling Survival	Low	Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-2-6	A-4
Unified: Surface	ML	ML
Subsurface	SC	ML

Inclusions: 25% Soils similar to Belzar, but containing fewer rock fragments; soils with a higher clay and rock fragment content in basin areas and depressions; Haplic Durixeralfs; small areas with slopes greater than 9 percent.

193 Typic Haploxerolls-Lithic Haploxerolls-Rock outcrop complex, 30 to 90 percent slopes

Elevation: 1,200 to 5,000 feet Annual Precipitation: 50 to 80 inches

Soil Map Unit Components	Typic Haploxerolls	Lithic Haploxerolls	Rock outcrop
Approx. Proportion	40%	30%	20%
Landscape Position	Mountain sideslopes and colluvial footslopes.	Mountain sideslopes.	
Slope	30 to 70 percent	50 to 90 percent	
Typical Vegetation	Douglas-fir, incense cedar, Pacific yew, bigleaf maple, snowberry, hazelnut, thimbleberry, wild rose, currant, penstemon.	Canyon live oak, madrone, black oak, Douglas-fir, incense cedar, sugar pine, poison oak, western mountain mahogany, annual grasses.	

Soil Profile Description

Surface Layer	0-13 inches. Brown slightly effervescent gravelly loam; strong very fine granular structure; neutral.	0-2 inches. Brown effervescent loam; moderate very fine granular structure; slightly acid.
Subsoil	13-30 inches. Yellowish brown strongly effervescent very gravelly loam; weak fine subangular blocky structure; mildly alkaline.	2-7 inches. Dark yellowish brown effervescent loam; moderate fine subangular blocky structure; neutral.
Substratum or Parent Material	30+ inches. Hard fractured schist or marble.	7+ inches. Hard marble.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-60 inches. Fractured schist or marble.	Less than 20 inches. Light gray, hard marble.
Available Water Capacity		
Total	1.6-4.8	2.2
Upper 20 inches	1.8	2.2
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	D
Permeability Class	Moderate	Moderately Slow to Moderately Rapid
Max Erosion Hazard	Moderate to High	High
Erosion Factor (K)	.10	.15
Drainage Class	Well	Somewhat Excessively
Soil Manageability		
Class	3EXp	4EXp
Group	III	IV
Range Type	Conifer (6)	Broadleaf Trees (10)
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	210-350
Survey Site Class	3 to 4	4 to 5
Relative Chance of Seedling Survival	Low to Moderate	Low to Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	GM	SM,GM,SM-SC
Subsurface	GM	SM,GM,SM-SC

Inclusions: 10% Fragmental soils and soils with a thin dark surface horizon and a clay increase in the subsoil.

194 Vipont-Hades families association, 15 to 50 percent slopes

Elevation: 4,800 to 6,400 feet Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	Vipont family	Hades family
Approximate Proportion	45%	30%
Landscape Position	Mountain sideslopes.	Volcanic mountain sideslopes.
Slope	15 to 50 percent	15 to 50 percent
Typical Vegetation	Rabbitbrush, Idaho fescue, ponderosa pine, juniper, cheatgrass, poa, mountain mahogany.	Greenleaf manzanita, bitterbrush, mountain mahogany, rabbitbrush, ponderosa pine, juniper.

Soil Profile Description

Surface Layer	0-25 inches. Brown cobbly to stony loam; weak fine platy to weak very fine granular structure; slightly acid.	0-5 inches. Grayish brown gravelly loam; weak fine platy structure; slightly acid.
Subsoil	25-40 inches. Brown very gravelly sandy clay; weak medium subangular blocky structure; neutral.	5-48 inches. Dark brown loam; weak fine subangular blocky structure; neutral.
Substratum or Parent Material	40+ inches. Hard, moderately fractured andesite or basalt.	48+ inches. Hard, moderately fractured basalt.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60 inches. Fractured andesite or basalt.	20-60 inches. Fractured andesite or basalt.
Available Water Capacity		
Total	4.3-5.3	5.5-8.3
Upper 20 inches	1.8	2.7
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	B
Permeability Class	Moderately Slow to Moderate	Moderately Slow to Moderate
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.20	.15
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3Ex
Group	III	III
Range Type	Sagebrush (4)	Browse-Mtn Shrub (5)
Range Site	III	VI
Annual Forage (lb/acre)	200-600	160-500
Forest Survey Site Class	6	5 to 6
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-2-6	A-4
Unified: Surface	ML	ML
Subsurface	SC	ML-CL

Inclusions: 25% Rock outcrop; soils with a thick dark surface horizon that have a high organic-carbon content; Lithic Argixerolls.

195 Washoe family, 0 to 5 percent slopes

Elevation: 4,400 to 4,800 feet Annual Precipitation: 9 to 12 inches

Soil Map Unit Components	**Washoe family**
Approximate Proportion	80%
Landscape Position	Terraces, basin areas and glacial outwash deposits.
Slope	0 to 5 percent
Typical Vegetation	Dwarf and big sagebrush with ponderosa pine, incense cedar, mountain mahogany.

Soil Profile Description

Surface Layer	0-14 inches. Grayish to pale brown loam; massive to weak fine subangular blocky structure; slightly acid.
Subsoil	14-36 inches. Pinkish gray very gravelly sandy clay loam; moderate fine subangular blocky structure; slightly acid.
Substratum or Parent Material	36+ inches. Terrace, colluvium and glacial deposits.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	40-60+ inches in glacial colluvium or outwash.
Available Water Capacity	
Total	3.3-4.3
Upper 20 inches	2.5
Infiltration Rate	Moderate
Hydrologic Soil Group	B
Permeability Class	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	High
Erosion Factor (K)	.37
Drainage Class	Well
Soil Manageability	
Class	3Epx
Group	III
Range Type	Sagebrush (4)
Range Site	IV
Annual Forage (lb/acre)	200-600
Forest Survey Site Class	7
Relative Chance of Seedling Survival	Very Low
AASHTO: Surface	A-4
Subsurface	A-2-6
Unified: Surface	ML
Subsurface	SC
Inclusions:	20% Rock outcrop; Lithic Argixerolls; soils with a dark surface horizon and clay increase in the subsoil.

196 Weitchpec family-Lithic Haploxeralfs association, 30 to 90 percent slopes

Elevation: 2,000 to 5,200 feet Annual Precipitation: 30 to 70 inches

Soil Map Unit Components	Weitchpec family	Lithic Haploxeralfs
Approximate Proportion	60%	30%
Landscape Position	Mountain sideslopes.	Mountain sideslopes.
Slope	30 to 70 percent	50 to 90 percent
Typical Vegetation	Douglas-fir, sugar pine, ponderosa pine, incense cedar, madrone, tanoak, huckleberry oak, pinemat manzanita, beargrass.	Western serviceberry, huckleberry oak, purple reedgrass, white fir, incense cedar, Jeffrey pine, Douglas-fir.

Soil Profile Description

Surface Layer	0-8 inches. Dark grayish brown very gravelly loam; strong very fine granular structure; medium acid.	0-10 inches. Light yellowish brown very gravelly loam; moderate very fine and fine subangular blocky structure; slightly acid.
Subsoil	8-14 inches. Brownish yellow very gravelly loam; weak fine subangular blocky structure; medium acid.	10-13 inches. Light yellowish brown very gravelly clay loam; moderate fine subangular blocky structure; neutral.
Substratum or Parent Material	14-22 inches. Light yellowish brown extremely gravelly loam; massive; medium acid.	13+ inches. Hard serpentinitic rock.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Hard serpentinitic bedrock.	Less than 20 inches. Serpentinitic bedrock.
Available Water Capacity		
Total	1.6-3.2	1.8
Upper 20 inches	0.9	1.8
Infiltration Rate	Moderately Rapid	Moderate
Hydrologic Soil Group	B	D
Permeability Class	Moderate to Rapid	Moderately Slow to Moderately Rapid
Erosion Hazard, Maximum	Moderate	High
Erosion Factor (K)	.10	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3epx	4Epx
Group	III	IV
Range Type	Conifer (6)	Browse-Mtn Shrub (5) and Chaparral
Range Site	IX	VI
Annual Forage (lb/acre)	150-550	100-300
Forest Survey Site Class	4 to 5	5 to 7
Relative Chance of Seedling Survival	Low	Low to Very Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-6
Unified: Surface	ML	GM
Subsurface	ML	SC,CL
Inclusions:	10% Rock outcrop and Guemes family.	

197 Woodseye family-Rock outcrop association, 50 to 90 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 60 to 100 inches

Soil Map Unit Components	**Woodseye family**	**Rock outcrop**
Approximate Proportion	50%	35%
Landscape Position	Mountain sideslopes and ridges.	
Slope	50 to 90 percent	
Typical Vegetation	Huckleberry oak, greenleaf manzanita, bittercherry, snowbrush, buckwheat, Indian paintbrush lupine, red fir, white fir, incense cedar.	

Soil Profile Description

Surface Layer	0-7 inches. Dark grayish brown very gravelly loam; moderate very fine granular structure; strongly acid.
Subsoil	
Substratum or Parent Material	7-19 inches. Brown very gravelly loam; massive; very strongly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	
Available Water Capacity		
Total	2.1 Max.	
Upper 20 inches	2.1	
Infiltration Rate	Moderate	
Hydrologic Soil Group	C	
Permeability Class	Moderate	
Erosion Hazard, Maximum	High	
Erosion Factor (K)	.28	
Drainage Class	Well	
Soil Manageability		
Class	4EXp	
Group	IV	
Range Type	Woodland-Chaparral (5)	Waste & Barren (7)
Range Site	VI	None
Annual Forage (lb/acre)	100-300	2
Forest Survey Site Class	4 to 5	
Relative Chance of Seedling Survival	Low	
AASHTO: Surface	A-4	
Subsurface	A-4	
Unified: Surface	ML,CL-ML	
Subsurface	GM	
Inclusions:	15% Rogue family and Jayar soils on colluvial slopes.	

198 Woodseye-Jayar families association, 30 to 70 percent slopes

Elevation: 4,800 to 6,800 feet Annual Precipitation: 60 to 100 inches

Soil Map Unit Components	Woodseye family	Jayar family
Approximate Proportion	60%	25%
Landscape Position	Mountain sideslopes and ridges.	Mountain sideslopes.
Slope	50 to 70 percent	30 to 70 percent
Typical Vegetation	Huckleberry oak, greenleaf manzanita, bittercherry, snowbrush, buckwheat, Indian paintbrush lupine, red fir, white fir, incense cedar.	Red fir, mountain hemlock, white fir, snowbrush, sadler oak, princes pine, strawberry shinleaf.

Soil Profile Description

Surface Layer	0-7 inches. Dark grayish brown very gravelly loam; moderate very fine granular structure; strongly acid.	0-2 inches. Brown very gravelly loam; strong very fine and fine granular structure; slightly acid.
Subsoil		2-24 inches. Yellowish brown very gravelly loam; moderate very fine and fine subangular blocky structure; slightly acid.
Substratum or Parent Material	7-19 inches. Brown very gravelly loam; massive; very strongly acid.	24-34 inches. Pale yellowish very gravelly sandy loam; massive; slightly acid.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	Less than 20 inches. Metamorphic rock.	20-60 inches. Metamorphic rock.
Available Water Capacity		
Total	2.1 Max.	1.6-3.7
Upper 20 inches	2.1	1.8
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	C	B
Permeability Class	Moderate	Moderate to Moderately Rapid
Erosion Hazard, Maximum	High	Moderate
Erosion Factor (K)	.28	.10
Drainage Class	Well	Well
Soil Manageability		
Class	3Epx	3epx
Group	III	III
Range Type	Browse-Mtn Shrub and Chaparral (5)	Conifer (6)
Range Site	VI	IX
Annual Forage (lb/acre)	100-300	150-550
Forest Survey Site Class	5	3 to 4
Relative Chance of Seedling Survival	Low	Low
AASHTO: Surface	A-4	A-4
Subsurface	A-4	A-4
Unified: Surface	ML,CL-ML	GM
Subsurface	GM	GM

Inclusions: 15% Rock outcrop; soils similar to Woodseye, with fewer rock fragments in the subsoil; Tallac family.

199 Mollic Palexeralfs-Mollic Haploxeralfs association, 15 to 50 percent slopes

Elevation: 5,000 to 6,800 feet Annual Precipitation: 30 to 50 inches

Soil Map Unit Components	Mollic Palexeralfs	Mollic Haploxeralfs
Approximate Proportion	65%	25%
Landscape Position	Mountain sideslopes, colluvial slopes and broad ridges.	Ridges and mountain sideslopes.
Slope	15 to 50 percent	30 to 50 percent
Typical Vegetation	Jeffrey pine, incense cedar, Douglas-fir, white fir, California fescue, greenleaf manzanita, squaw carpet, California coffeeberry, huckleberry oak.	Perennial grasses, Jeffrey pine, incense cedar, Douglas-fir, white fir, buckbrush, greenleaf manzanita.

Soil Profile Description

Surface Layer	0-7 inches. Brown very gravelly sandy clay loam; weak fine and medium granular structure; neutral.	0-5 inches. Dark reddish brown gravelly loam; moderate fine and medium granular structure; mildly alkaline.
Subsoil	7-28 inches. Brown gravelly clay; moderate medium and coarse subangular blocky structure; neutral.	5-9 inches. Dark brown silty clay loam; moderate medium subangular blocky structure; neutral.
Substratum or Parent Material	28+ inches. Cemented till.	9+ inches. Cemented till.

Soil Qualities and Management Interpretations

Soil Depth and Parent Material	20-40 inches. Cemented till.	Less than 20 inches. Cemented till.
Available Water Capacity		
Total	3.2-7.4	1.3-3.1
Upper 20 inches	1.7	2.2
Infiltration Rate	Moderate	Moderate
Hydrologic Soil Group	B	D
Permeability Class	Slow	Moderately Slow
Erosion Hazard, Maximum	High	High
Erosion Factor (K)	.05	.20
Drainage Class	Well	Well
Soil Manageability		
Class	3E	3Ep
Group	III	III
Range Type	Conifer (6)	Conifer (6)
Range Site	IX	IX
Annual Forage (lb/acre)	250-750	250-750
Forest Survey Site Class	4	5 to 7
Relative Chance of Seedling Survival	High to Moderate	Low
AASHTO: Surface	A-6	A-4
Subsurface	A-7	A-7
Unified: Surface	SC	ML-CL
Subsurface	CH	CH

Inclusions: 10% Soils similar to Kang, but occuring at higher elevations; Lithic Argixerolls