



**United States  
Department of  
Agriculture**

Forest Service

Pacific  
Southwest  
Region

June 1995

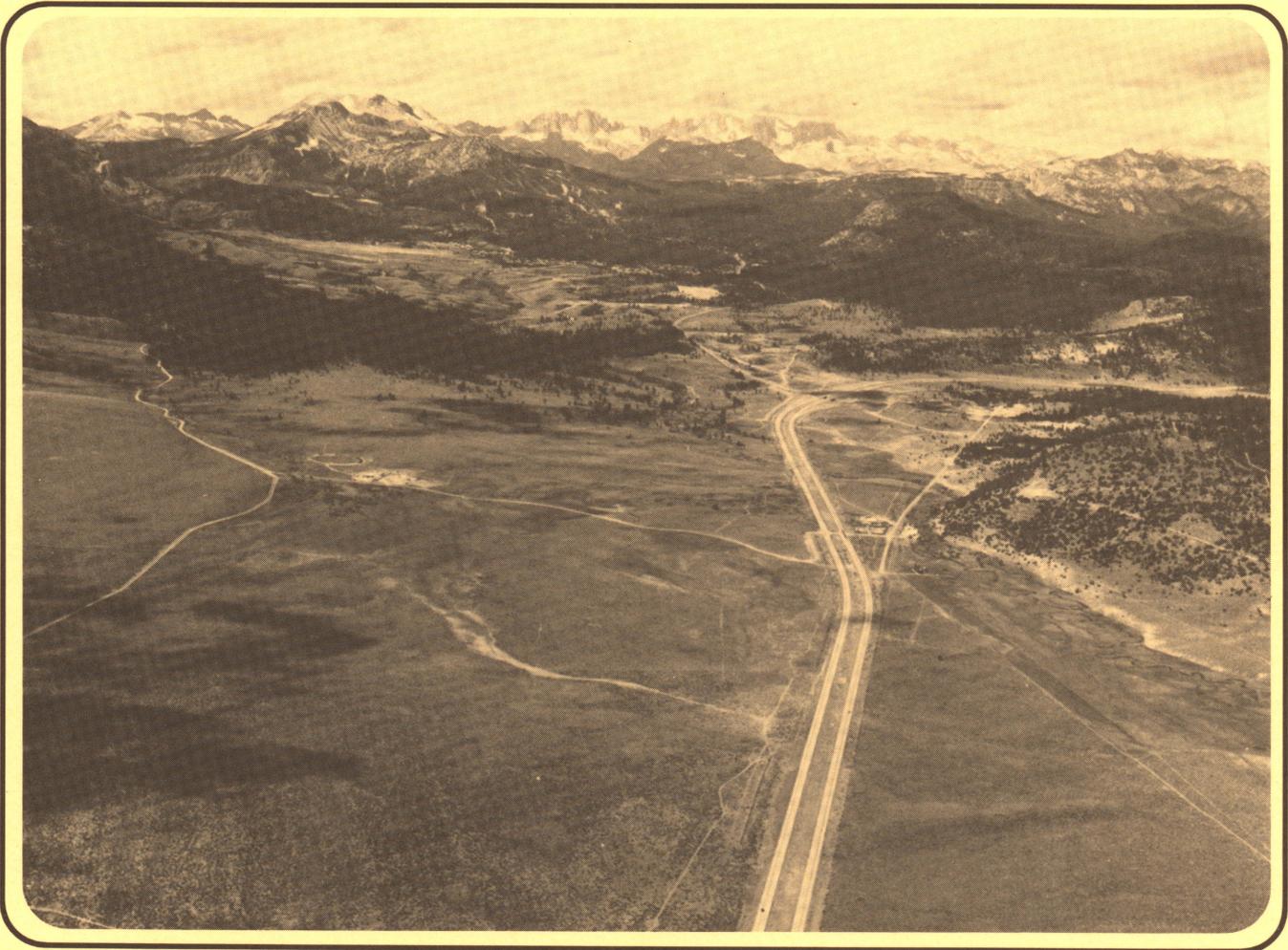
In cooperation with:

U.S.D.A.  
Natural Resource  
Conservation Service

Regents of the University of  
California (Agricultural  
Experiment Station)

# **Soil Survey**

## **Inyo National Forest West Area California**





# How To Use This Soil Survey

## General Soil Map

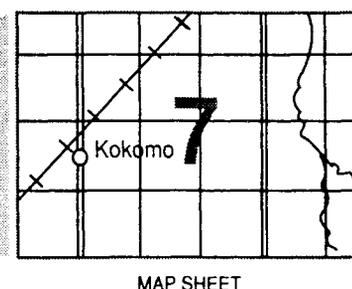
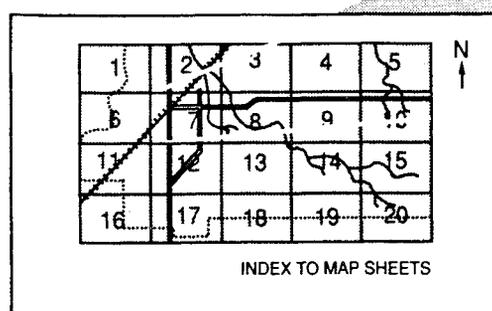
The general soil map, which is the small scale map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

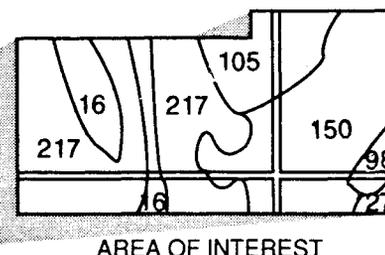
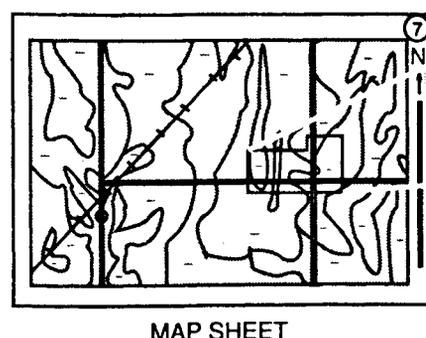
## Detailed Soil Maps

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.



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.



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.

## Inyo National Forest, West Area, California

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This is a publication of the United States Department of Agriculture, Forest Service, Pacific Southwest Region, and is a joint effort with the University of California (Agricultural Experiment Station) and the Natural Resource Conservation Service. As a part of the National Cooperative Soil Survey, the fieldwork and technical quality control for this survey were the responsibility of the Forest Service. The correlation of the soils was done by the Natural Resource Conservation Service in consultation with the Forest Service. The Natural Resource 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, handicap, or age.

Major fieldwork for this soil survey was performed in the period 1978 - 1991. Soil names and descriptions were approved in March 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Forest Service and the Natural Resource Conservation Service. In addition, portions of the Bodie-Coleville and Benton-Owens Valley Soil Survey's were used in the development of this soil survey. The soil survey area consists of the western, non-Wilderness portion of the Inyo National Forest, in parts of Inyo, Mono, Madera, Tulare and Fresno counties.

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

Cover: View northwestward from south of Mammoth Lakes, California in Long Valley Caldera. The Minaret's and Mammoth Mountain are in the background.

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## Foreward

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The Soil Survey of the Inyo National Forest, West Area, in parts of Inyo, Mono, Fresno, Madera and Tulare Counties, was designed to facilitate forestwide resource management planning and to increase the knowledge of our environment. It contains predictions of soil behavior for selected land uses. It also points out inherent limitations or hazards to land uses.

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. The survey could be used for detailed resource management and project level planning with field verification.

Major differences in soil properties can occur even within short distances. Some soils are shallow to bedrock and have low available water capacity. These conditions inhibit plant growth. Some soils are seasonally wet and have a high water table or are subject to flooding.

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 kind of soil in the survey area is described, and information is given about each soil for specific uses.

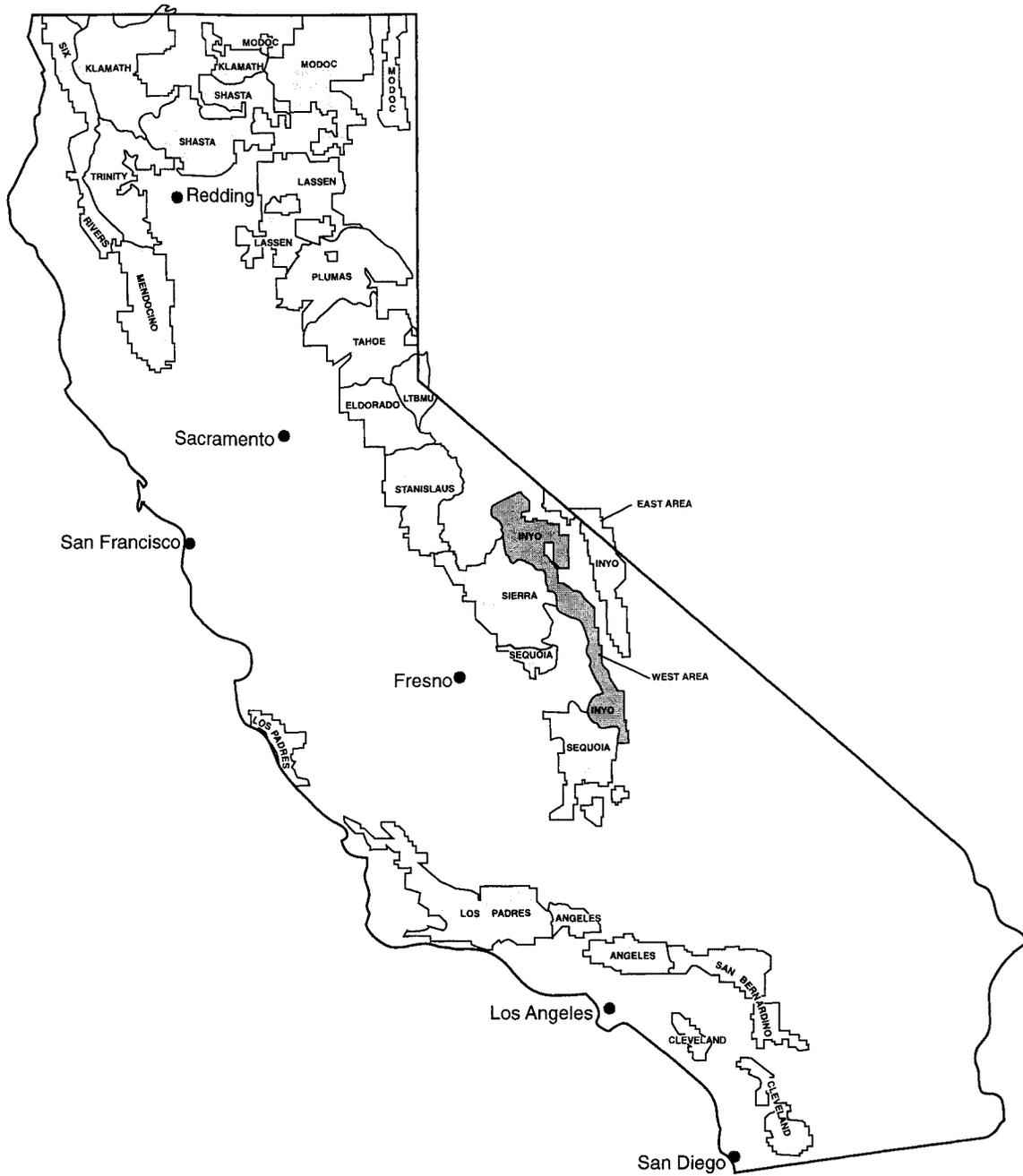
This soil survey can be useful in the conservation, improvement, and productive use of soil, water, and other resources.



**DENNIS W. MARTIN**

Forest Supervisor

Inyo National Forest



Location of Inyo National Forest,  
West Area California



# Soil Survey of Inyo National Forest, West Area, California

By Joseph P. Seney and Juan A. Gallegos, Forest Service

Soils surveyed by Juan A. Gallegos, B. Scott Jackson  
and Desiderio Zamudio, Forest Service

The Inyo National Forest, West Area, California is 792,677 acres in size. This acreage includes 28,000 acres of private land and 6,614 acres of land owned by the City of Los Angeles. Most of the acreage is in Mono County, with 516,341 acres and Inyo County, with 222,289 acres. The other counties are Madera, Tulare and Fresno Counties, with a total of 54,047 acres. The survey area includes only the nonwilderness portion of the eastern Sierra Nevada, or western side of the forest.

The Inyo National Forest is situated near the Los Angeles metropolitan area, one of the world's most heavily populated areas. The forest is responsible for providing timber and grazing in the area. It also provides recreational facilities, such as Mammoth Mountain, and unsurpassed angling and outdoor recreation. In addition, it provides a continuous supply of water to the six million people who live in the Los Angeles basin.

The survey area is located on the lower slope of the eastside of the Sierra Nevada. It extends about 165 miles in a north-south direction. The Toiyabe National Forest borders the survey area to the northwest. The portion of the Mono Valley Area which is administered by the Bureau of Land Management (U.S. Department of Interior), borders the area on the north and northeast. Adobe Valley, Benton Valley, Chalfant Valley and the Owens Valley define the area's eastern boundary. The Ansel Adams, John Muir, Golden Trout, Southern Sierra Wildernesses and Yosemite National Park serve as the area's western boundary, and the southern boundary is near the town of Coso Junction, California.

## General Nature of the Survey Area

This section provides general information about the survey area. It discusses history and development, natural

vegetation, geomorphology, geology, relief, drainage, water supply, climate and soils.

## History and Development

President Theodore Roosevelt created the Inyo National Forest by proclamation on May 25, 1907, when he withdrew 221,324 acres of land along the Owens River from settlement or entry. This was done to protect Los Angeles' water interests in the eastern Sierra. In 1908, an additional 1,350,537 acres were transferred from the Sierra National Forest to the Inyo by Executive Order 899. Then in 1911, President Taft directed that 275,000 acres in the Owens Valley be restore to public entry, thereby eliminating valley land from the Forest. Nine years later in 1920, the Kern National Forest was divided between the Sequoia and the Inyo, with the Mt. Whitney Ranger District going to the Inyo. The last large scale acquisition came in 1945 when the southern portion of the former Mono National Forest was transferred to the Inyo.

Archaeological investigations in the Forest and in the surrounding region indicate that human occupation began 10,000 or more years ago. Paleoindian sites have been found in Mono Basin, Long Valley and Owen Valley. There is also evidence that use of the outstanding obsidian sources on the Forest began at this time. Indicators surfaced sometime around 6,000 years ago, suggesting that more intensive use of the area, with generally increasing population through time.

Five centuries after the time of Christ a major change in land-use patterns becomes apparent in the archaeological record. By 1,000 years ago in the Owens Valley there is a clear shift to sedentary villages, intensive use of Pinyon pine, and development of the territorial

boundaries seen at the time of historic contact. At this time we also see the beginning of an alpine adaptation in the White Mountains where the highest altitude village sites in prehistoric North America are found. Some researchers hypothesize that this change signals the movement of the ancestors of contemporary Native Americans into the area.

In the mid-19th century when non-Indian people began to move into the eastern Sierra, they invaded lands occupied by Paiute and Shoshone peoples. Mono Basin was the territory of the Kuzedika's Paiute. As was common in the Great Basin, these folk took their name from an important food source, namely the brine fly, and the name means "brine-fly-larvae eaters". Whether Long Valley contained a resident population has not yet been established. It was used by native people from all the surrounding area, including the North Fork Mono from the western Sierra. From Benton south to Owens Lake, the land was claimed by various bands known collectively as the Owens Valley Paiute. These bands had a greater degree of socio-cultural integration than most Great Basin groups, with permanent villages, irrigated lands, individual ownership of Pinyon trees and hereditary headmen. At the southern end of Owens Lake and in Saline Valley were the southern Shoshone bands and in the southern Sierra Nevada were the Tubatulabal. Today the descendants of these people are organized into 11 different federally recognized tribes and communities.

In the early 1850s the area saw the encroachment by non-native settlers, miners, and traders. As the population expanded and grew, the Owens Valley and Mono Basin areas took on a rural agriculture or ranching character, depending on the availability of transportable water. This supported nearby mining activity which was experiencing a boom era. Both narrow-gage and wide-gage railroads and wagon roads provided the means of marketing the meat and produce in the mining camps.

About the turn of the century the water of the area took on additional significance. Hydroelectric developments were built to meet the needs of both local and distant modernization. The export of water from the Owens Valley to the Southern California urban areas gradually increased as property and water rights were acquired, paralleling the decline of agriculture and mining. Today, the City of Los Angeles is the third largest land management agency of the area, with 330,000 acres of the valley floor devoted to limited ranching or non-use. The Forest Service, Bureau of Land Management, and City of Los Angeles now control more than 95 percent of the basin area and tourism has become the principal industry.

The Inyo National Forest is one of the highest recreational-

use Forests in the United States, with more than six million visitors each year. The other resources of the Forest are important, although they primarily provide support for recreational activities and the needs of the resident populations.

## Vegetation

Vegetative diversity on the Inyo National Forest has been significantly altered from natural levels primarily through water diversion, especially affecting riparian areas and wet meadow systems. Past overgrazing and fire suppression have reduced seral stage diversity and allowed woody vegetation to encroach on meadow systems preventing natural fire-caused rejuvenation. In addition, commercial timber management has reduced the extent of older seral stages of coniferous forests.

The vegetative cover (4) is predominantly semi-desert (shrubs) communities in lower and mid-elevations with mixed conifer forests communities at higher elevations. Most conifer stands are at elevations above 6,000 feet. An estimated two percent of the survey area is wetland vegetation.

The natural vegetative groups and their approximate proportionate extent in the survey area are as follows:

Sagebrush Steppe	40 percent
Montane-Subalpine Forest	25 percent
Jeffrey Pine Forest	13 percent
Barren-Rock Outcrop	12 percent
Juniper-Pinyon Woodland	3 percent
Blackbrush-Shadscale scrub	3 percent
Chapparral	2 percent

The sagebrush steppe community includes shrubs, forbs and grasses well adapted to withstand long periods of heat and drought. Basin or big sagebrush (*Artemisia tridentata*) 4,000 feet to 10,600 feet with bitterbrush (*Purshia tridentata*) and low sagebrush (*Artemisia arbuscula*) dominant in slightly drier and saline-alkaline areas, respectively. Some of the common sagebrush steppe plant species are sagebrush (*A. nova* and *A. rothrockii*), manzanita (*Arctostaphylos spp.*), wheatgrass (*Agropyron spp.*), needlegrass (*Stipa spp.*) and squirreltail (*Sitanion hystrix*).

The Montane-Subalpine and Jeffrey Pine Forests generally occur in mixed stands, although pure stands of Jeffrey pine (*Pinus jeffreyi*) and red fir (*Abies magnifica*) do occur. The elevational range for these forest communities range from 6,000 feet for Jeffrey pine (*Pinus jeffreyi*) to greater than 9,000 feet for red fir (*Abies magnifica*) and lodgepole pine (*Pinus contorta* var. *murrayana*). Other common Montane Forest species are

foxtail pine (*Pinus balfouriana*), white fir (*Abies concolor*), mountain hemlock (*Tsuga mertensiana*), western white pine (*Pinus monticola*), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*) and manzanita (*Arctostaphylos* spp.).

The Barren-Rock Outcrop vegetative group, ranging from 4,000 feet up to 13,400 feet, occurs throughout all other vegetative groups. At higher elevations, including alpine communities, dominant vegetation consists of sedges (*Carex* spp.), rushes (*Juncus* spp.), buckwheats (*Eriogonum* spp.), fescue (*Festuca* spp.), phlox (*Phlox* spp.), bluegrass (*Poa* spp.) and squirreltail (*Sitanion* spp.), mountain mahogany (*Cercocarpus* spp.), in dry to moist sites. Some of the common wet site plant species are sedges (*Carex* spp.), rushes (*Juncus* spp.), willow (*Salix* spp.), birch (*Betula occidentalis*), wild rose (*Rosa woodsii*) and aspen (*Populus* spp.).

Juniper-Pinyon Woodland occurs sporadically throughout the survey area, generally on dry east slopes of the southern Sierra and the Mono Lake area. The elevation ranges from 6,000 feet north of Bishop to 7,500 feet in the Mono Lake Basin. Common plant species in this woodland area are singleleaf Pinyon (*Pinus monophylla*), western juniper (*Juniperus occidentalis*), Utah juniper (*J. utahsis*), curlleaf mountain mahogany (*Cercocarpus ledifolius*), basin sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*) and rabbitbrush (*Chrysothamnus parryi*).

The Blackbrush-Shadscale and Chaparral communities cover approximately five percent of the survey area. In general, Blackbrush-Shadscale communities are located throughout basins in the southern portion of the survey area and in valleys southeast of Mono Lake. A few common species are blackbrush (*Coleogyne ramosissima*), shadscale (*Atriplex confertifolia*), bud sagebrush (*Artemisia spinescens*), Nevada ephedra (*Ephedra Nevadensis*), greasewood (*Sarcobatus vermiculatus*) and hopsage (*Grayia spinosa*).

### Geology and Geomorphology

The survey area straddles the boundary between the Sierra Nevada and Basin and Range physiographic provinces. The Sierra Nevada has been block faulted upward relative to the Owens Valley, the Long Valley Caldera, and Mono Lake along a series of large, normal faults which extend the length of the survey area. Characterized by great topographic relief, the area is underlain by a variety of bedrock materials which have been subjected to mechanical weathering by water and ice, but are largely unaffected by chemical alteration. Mechanical weathering and volcanic events have resulted in a limited variety of surficial deposits. Landforms

within the study area are most commonly associated with erosion subsequent to fault movement within the last 3 million years, glacial activity within the last 1.2 million years, and volcanic activity within the last .7 million years. Major drainages are short and are most commonly the result of glacial modification. Elevations within the area range from 3,760 feet just west of Owens Lake, to 13,665 feet on Birch Mt. and over 12,000 feet on Lone Pine Peak, Mt. Tinemaha, and Mt Warren.

The bedrock in the study area is composed of igneous rock, both intrusive and extrusive, and slightly metamorphosed volcanics and sedimentary sandstones, limestones and shales, such as quartzites, marbles and slates. The intrusive rock types are primarily granite, quartz monzonite, and grandiorite and can be found throughout the mountainous portions of the survey area. The extrusive rock types are primarily rhyolites, basalts, and volcanic tuffs which occur within what is known as the Long Valley Caldera, between the northern edge of the caldera and Mono Lake, on what is known as the volcanic tablelands, and within a small volcanic field south of the town of Big Pine.

Surficial deposits are abundant in the survey area and are alluvium and colluvium, glacial till, and loose pumiceous or cindery volcanic material. Unconsolidated alluvium (stream and fan deposits) occurs throughout the low relief portions of the survey area. Stream-reworked glacial till occurs within the Long Valley Caldera and adjacent to Mono Lake. Colluvium (talus and angular loose rock on steeper slopes) occurs on the higher relief portions of the survey area. Glacial till occurs on the topographic transition between the high and low relief portions of the survey area north of Big Pine creek and makes up a substantial portion of the surficial deposits at the mouths of Hilton, McGee, Convict, Laurel, Mammoth, Reverse, Rush, Bloody, Lee Vining, and Lundy Creeks. Loose pumiceous and cindery material occurs within the western portion of the Long Valley Caldera, between the caldera and Mono Lake, and within a small volcanic field south of the town of Big Pine.

Water resources within the Inyo National Forest are strongly influenced by topography and can vary widely over relatively short distances. For example, streamflows fluctuate significantly within the watershed, and vary from intense, high-volume, short duration flows to very minimal flows to intermittent flows which may dry up during July and August. The differences in streamflow are related to time of day and season, highly variable precipitation, local geology and geomorphology. Water flowing off the Forest amounts to an average of 1,093,000 acre-feet per year. Groundwater recharge from precipitation is another important water resource. Most

recharge occurs in the upper elevations, especially in montane and subalpine meadow systems. Finally, a third significant water resource is geothermal. Approximately 260,000 acres of the 460,000 acre Mono-Long Valley known Geothermal Resource Area are on National Forest land. Approximately 39,000 acres are currently under lease.

## Climate

The climate in the survey area has both Mediterranean and Basin and Range type influences, consisting of dry, hot summers with occasional afternoon thundershowers and cool, moist winters. The eastern Sierra escarpment strongly influences temperature and precipitation patterns, which can vary greatly over short distances.

In general, temperature decreases and precipitation increases with an increase in elevation. Summer daytime temperatures can top 100°F at lower elevations with nighttime temperatures in the 60's. In higher regions in January, temperatures range from -20 to 40°F. Precipitation ranges from 4 inches a year on the Owens Valley floor (4,000 feet) to 45 inches a year at Mammoth Pass (9,000 feet). In most situations, 80 to 90 percent of precipitation falls as snow, especially at elevations greater than 7,000 feet.

## Formation of Soils

Soil is a mixture of rocks, organic matter, water and air, in varying amounts. The five soil forming factors are: **1) parent material** - the physical and chemical composition of the parent material; **2) relief** - the effects of aspect, slope and drainage; **3) climate** - the site precipitation and temperature patterns; **4) biological activity**; and **5) time** - the length of exposure of the parent material to the other soil forming factors.

The relative importance of each factor differs from place to place, although the interaction of all the factors determines the kind of soil that forms in any given place.

The parent material of the soils in the survey area is both residual and transported. Essentially, soils are formed in weathered rock or unconsolidated material. The geologic parent materials in the survey area exhibit wide diversity of age and rock types. The type of parent material greatly influences soil development and related properties. For example, soils developing over granitics or quartz monzonite typically have coarser textures and a higher percentage of sand particles. Conversely, soils developing over basalt tend to have finer textures and a higher percentage of silt particles.

The relief or topography of a landscape setting is usually influenced by the type of bedrock. Relief influences soil formation primarily by its effect upon drainage, steepness of the terrain, runoff and aspect or exposure to the sun and wind. For example, a very steep south-facing slope in the survey area generally, will have shallow soils, rapid runoff, and more importantly, is covered with a less dense vegetative cover due to its drier and warmer nature. Conversely, on northeast-facing slopes, soils will be deeper, have slow to moderate runoff and a thicker vegetative cover as a result of less solar radiation, which generates cooler and wetter sites.

The amount of solar radiation is a prime example of how climate affects soil formation. Heat and moisture influence the amount and kind of vegetation that grows, the rate at which vegetation and minerals weather and the removal and accumulation of material in different soil layers. In general, summers are dry except for occasional thundershowers at higher elevations. Winters are cool and moist, and most precipitation falls between December and March. Soils remain moist through late spring, but by July and August these same soils are very dry. Soil moisture is considered the most limiting plant growth factor throughout the eastern Sierra.

Vegetation is the dominant biological force that affects the formation of soils. Vegetative growth results in the accumulation of organic material in the surface layers, provides shade and duff which reduces surface runoff and erosion, the penetration of roots which promotes cycling of water and nutrients, provides habitat and a food source for small animals, insects, bacteria and fungi which provide the mechanisms for cycling of organic materials, soil and soil nutrients. For example, soils that develop under sagebrush vegetation are low in organic matter and often have a light-colored surface layer and sparse litter deposits. Soils that develop under dense, perennial grasses normally have a higher organic matter content and a dark-colored surface layer.

A key component in the development of soils is time. Generally, the age of a soil is related to the degree of profile development and layer differentiation within the soil. Immature or young soils have little or no horizonation. For example, many soils in the survey area are Entisols or Inceptisols, such as, Nanamkin and Stecum soils. Meanwhile, soils with strong layer or horizon development are considered mature or older soils. These soils have pronounced accumulations of materials such as clay or calcium carbonate in subsurface horizons. Temperature and moisture are the two critical factors which control soil development through time. For example, soils at elevations greater than 11,000 feet in the survey area have sufficient moisture, but temperatures are too cold to promote rapid soil development. Conversely,

soils at elevations below 6,000 feet have warmer temperatures, but lack sufficient moisture for significant soil profile development.

## Use and Management of the Soils

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

Information in this section can provide a basis for assigning management priorities to land areas that have few or less severe limitations and for determining areas where more detailed or site-specific soil information is needed. Additional information about each soil and its use and management is given under "Detailed Soil Map Unit Descriptions". In that section, individual soils are evaluated for their productivity, their manageability limitations, and their potential for production of forage and timber.

### Watershed

The vast majority of runoff from Inyo National Forest land is used for domestic or municipal supplies or for irrigation. Although small and localized bacterial, nutrient and chemical problems exist, established basin water quality objectives are met by 97 percent of the total of approximately 1,093,000 acre-feet per year of water flowing off Forest lands.

Soils in the Forest are managed for watershed protection by preventing soil erosion and maintaining productivity. Overland flow or runoff on shallow forest soils can increase tremendously when wildfires induce the formation of water-repellent soil layers. Prevention of large wildfires through more intensive vegetative management is an important objective of soil management. Overall, the major source of sediment on the Inyo are wet meadows that have been severely eroded over the past century. The 1981 Forest Watershed Improvement Needs (WIN) inventory surveyed 26,000 acres of meadow, 23,560 acres of which needed improvement to either maintain or restore water quality.

### Range Production

The range forage program on the Inyo National Forest currently ranks fifth among Forests in California with 41,400 AUMs (Animal Unit Months) of use. An animal-unit-month is the amount of forage required to feed one animal unit, one cow, one mule, five sheep or five goats for 30 days. The grazing season typically extends from late June to late September. Range allotments cover 886,103 acres, of which 399,296 acres are actually suitable for grazing. In many cases, these lands need prescribed fire treatment and water development to be suitable for commercial grazing.

Soil properties that affect moisture and plant nutrients have the greatest influence on productivity of range plants. Generally, the most productive range soils are those that have a high available water capacity and are located in areas where precipitation occurs throughout the growing season. Proper forage utilization should ensure enough cover to protect the soil and maintain or improve site productivity. For example, adequate litter and duff, fencing, distribution of water and salt blocks, and supplemental feeding are practices which maintain or improve range productivity.

### Wildlife Habitat

Soils affect the distribution and density of vegetative cover that is available to wildlife as food and cover. In addition, they also affect the construction of man-made or natural water impoundments, which in turn, can significantly influence the quality of wildlife habitat.

Fish, wildlife, and botanical resources occur across the landscape. As in all natural systems, these resources are not evenly distributed. The Inyo National Forest stretches across four vegetative provinces; Great Basin, Sierra Nevada, Mohave and Sonoran. The riparian or wet meadow portions of these provinces provide the best opportunities for wildlife to prosper. Overall, this wide array of vegetative types provide habitat for over 400 terrestrial vertebrate species, including two Federally listed birds (bald eagle and peregrine falcon), 13 Federal candidate species, eight species recognized as sensitive within California, and over 50 neotropical migratory birds.

The northern goshawk and the pine marten are two species associated with mature timber vegetation types. These species, as well as wolverines, Sierra Nevada red fox, and fishers are fairly common along the eastern slopes of the Sierra Nevada, especially in late seral stage Jeffrey pine forests. Other species of interest include three herds of mountain bighorn sheep in the high Sierra and one herd of Nelson mountain sheep that range throughout the White-Inyo mountains.

Amphibian populations are relatively rare, with isolated populations, due to predation by introduced species of trout. Populations of mountain yellow-legged frogs, Pacific chorus frogs and Yosemite toads are generally found in high-elevation alpine lakes and creeks. Although, two populations of yellow-legged frogs have been found at lower elevations in the eastern portion of the Mono Lake District. In addition, Mono Lake is a highly productive inland sea which contains an abundance of both brine shrimp and brine flies. These aquatic invertebrates provide a food source for over one million shorebirds and waterfowl.

## Recreation

Recreation is the most significant resource on the Inyo National Forest, and the Forest has consistently ranked within the top five National Forests nationwide in terms of total recreation use. An estimated 8,500,000 recreation visitor days (RVD's), or 21 million recreation visits were recorded in 1994. The intensive recreation visitation is a direct result of the Forest's location, near the Los Angeles metropolitan area and the wide and varied dispersed activities available on the Forest. Dispersed recreation use occurs over 1.9 million acres designated Wilderness and other undeveloped areas, accounting for approximately 30 percent of the total use. The bulk of the recreation use occurs in the developed areas, such as ski areas, campgrounds, picnic sites, visitor centers, and lodges, which is concentrated within about two percent of the land base.

The Inyo National Forest has over 3,000 developed campsites, both public and private, 1,100 miles of foot trails and over 5,000 miles of unpaved vehicle routes. Nearly every major drainage of the Sierra Nevada on the Inyo National forest outside of designated Wilderness is currently occupied with concentrated recreation developments. Increased use of the Forest by recreational off-road vehicles, off-road bicycles, horse and foot traffic has intensified soil impacts, especially soil compaction, reduced infiltration and increased surface runoff so that it becomes necessary to close campgrounds and reroute foot or vehicular paths.

Soils in the survey area are rated in the map unit descriptions for their manageability. The rating system considers soil properties useful in recreation planning. For site-specific planning, more detailed soil investigations and interpretations may be required. The following is a brief overview of a few soil characteristics important for some kinds of recreational sites.

Trail systems for hikers, horseback riders, and off-road bicyclists should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding for extended periods of time. In addition, trails should be located on nearly level to moderate slopes, with slopes not exceeding 12 percent.

Campgrounds and picnic areas require site preparation such as shaping and leveling and are subject to heavy foot traffic. The best soils have similar characteristics as soils for trail systems, nearly level slopes, firm when wet, not dusty when dry, with few stones and boulders.

## Forestry

The commercial timber base consists of 75,000 acres of which 60,000 acres is Jeffrey pine, 11,000 acres is lodgepole pine and 4,000 acres is mixed conifer. The timber base is located between the towns of Mammoth Lakes and June Lake, is bounded on the west by the San Joaquin crest and extends east to Glass Mountain. The sites are generally poor, with Forest Site Classes of 5 or 6.

The allowable sale quantity (ASQ) as set by the Forest Plan is 7.1 million board feet annually. This has traditionally been broken out into sawlog sales, 5.5 million, and fuelwood sales of 1.6 million. Sawlog sales are logged over snow with ground-based equipment, while fuelwood sales are performed in the summer with equipment varieties from pickup trucks to skidders. Sawlog sales impact three to five thousand acres annually, while fuelwood sales impact an additional 500 to 1,000 acres. Moreover, an additional 3.2 million board feet has been removed by public fuelwood cutters. Demand for fuelwood has significantly increased in the past few years, and as a result, fuelwood gathering areas are being over-utilized. Care must be taken to protect the soils.

## How This Soil Survey Was Made

This is an Order 3 soil survey. It has followed the directives and guidelines in the Forest Service Manual and Handbooks and the concepts, procedures, and guidelines of the National Cooperative Soil Survey as specified in the Soil Survey Manual (5), the National Soils Handbook (1,7), and the soil classification system as stated in Soil Taxonomy (6).

Soil Scientists began the inventory by collecting, studying, and correlating soil genesis and morphology data, including lithological (3), geomorphological, topographical, climatic, vegetative data for the soil survey area and for adjoining areas, mainly the Bodie-Coleville and Benton-Owens Valley survey areas.

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

Using the augmented and corrected schematic map, field notes, and an understanding of how the photograph images relate to actual conditions on the ground, the soil scientists 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 photograph interpretation. The aerial photographs with the delineated map units and delineation symbols became the exploratory or preliminary soils map.

With the aerial photographs (exploratory soils maps) and a field stereoscope, the soil scientists examined as many delineations of each map unit on the ground as was possible, considering limited access in places and the time allowed to complete the survey. Map units were examined, studied, and described by aerial photograph interpretations and on-the-ground investigations.

Because the survey is Order 3 in intensity (2), and because of the time allotted for its completion, not every delineation of each map unit was visited and examined on the ground. Few delineations with no easy access were visited, but they were scrutinized by aerial photograph interpretation. Possibly one-third to one-half of the delineations on the field sheets and maps were not examined on the ground. Consequently, the data in this report are not suitable for project planning without field verification.

At each site that was visited and examined, individual soils were studied, named, described and classified, and enough data were collected 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 in most places consist of a group of soils on a particular landscape that has been delineated on the aerial photograph 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 a consociation, an association or a complex. The soil scientists made a field study and aerial photograph examination to estimate the percentage of each soil component in each map unit. The map units do not necessarily consist of similar soils. They consist of geographically associated soils that may be, and in places are, quite different in their characteristics and their suitability for use and management. For this reason also, the data in this report are not suitable for project planning without field verification.

The interpretations and predictions concerning use and management in this report are based on the soil scientists' knowledge and understanding of the conditions recognized and measured in the field. In classifying the soils, soil scientists can also, with acceptable reliability, bring information concerning use and management of a particular soil from other survey areas where the same soil occurs and has been recognized and studied. Some use and management interpretations and predictions should be considered as first or second approximations owing to the relatively few examinations and measurements that were made. This is still another reason that limits the data in this survey for project planning without field verification.

Despite the cautions that have been given concerning the use of data in this survey for project planning, the survey is adequate and reliable for its intended and designed purpose: a base for a forestwide 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 consists of soils that have similar soil temperature regimes and parent material. 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 in the unit. The soils in one unit can occur in other units. The soils are classified at the family level or a higher taxonomic level.

The general soil 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 identified.

Because of the generalization of map units and the small scale of the map, the location of specific soils is not shown. The map and map unit information are not suitable for land management planning at the forestwide or project level. They give a very general overview of soil conditions and are suitable for state or regional planning. Groups of soils and the map units making up each group are described on the pages that follow.

### *Soils in the Thermic Soil Temperature Regime*

In the thermic soil temperature regime, the mean annual soil temperature is 59 to 72°F. The soils in this group are generally on gentle aspects at an elevation of 3,700 to 6,800 feet. They are on alluvial fans, fan terraces and bench terraces. Slopes range from 5 to 30 percent. Annual precipitation ranges from 4 to 10 inches.

The soils in this group are deep to very deep and are moderately well drained to excessively drained. The plant species on these soils are white bursage, spiny hopsage, schadscale, Nevada ephedra, blackbrush and desert needlegrass. These soils are used mainly for watershed, wildlife habitat, and recreation.

#### **1. Goodale-Lubkin-Whitewolf families**

The soils in this map unit formed in material weathered from granitic and basaltic rock. They are on alluvial fans, fan terraces, bench terraces and lower hillslopes that have slopes of 5 to 30 percent. This unit makes up about one percent of the survey area.

Approximately 31 percent of the unit is Goodale family, 27 percent is Lubkin family soils, and 26 percent is Whitewolf family soils. The remaining 16 percent is comprised of the Taboose, Arizo and Cajon families.

Goodale family, granitic alluvium soils are very deep, have a bouldery loamy coarse sand surface layer and are somewhat excessively drained. Lubkin family soils are formed in granitic alluvium with a gravelly loamy sand surface layer and are well drained. The Whitewolf family has similar characteristics but has a coarse sand surface texture.

### *Soils in the Mesic Soil Temperature Regime*

In the mesic soil temperature regime, the mean annual soil temperature is 47 to 59°F. The soils in this group are widely distributed throughout the survey area. The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice and tuff. The elevation ranges from 4,300 to 9,600 feet. The soils are on mountainsides, hillsides, valley bottoms, lake terraces, fan terraces, moraines, ridges and colluvial slopes. Slopes range from 0 to 90 percent. Annual precipitation ranges from 4 to 30 inches.

The soils in this group are shallow to very deep and are well drained to excessively drained. The plant species on these soils are big sagebrush, Jeffrey pine, red fir, lodgepole pine, singleleaf pinyon and western juniper. The areas are used mainly for watershed, wildlife habitat, recreation and fuelwood production.

#### **2. Wrango-Berent-Waterman families--Rock outcrop**

The soils in this map unit formed in material that weathered from granitic rock. They are on mountainsides, hillsides, lake terraces, moraines, ridges and colluvial slopes of slopes of 0 to 90 percent. This unit makes up about 19 percent of the survey area.

Approximately 56 percent of the map unit is Wrango family soils, 17 percent is Berent family soils and 15 percent is Waterman family soils. The remaining 12 percent is comprised of minor components of a variety of other family soils and rock outcrop.

Wrango family, weathered from granitic materials are very deep, have a loamy coarse sand surface layer and are somewhat excessively drained. Berent family soils are formed in granitic materials with a loamy sand surface layer and are somewhat excessively drained. The Waterman family has similar characteristics as the Wrango and Berent families.

### **3. Rock outcrop-Bairs family-Torriorthentic Haploxerolls**

The soils in this map unit formed in material that weathered from granitic, basaltic and mixed rock. They are on alluvial fans, fan terraces, glacial moraines, hillsides and mountainsides, on slopes of 0 to 90 percent. This unit makes up about 8 percent of the survey area.

Approximately 15 percent of the unit is rock outcrop, 15 percent is Bairs family soils, 15 percent is Torriorthentic Haploxerolls. The remaining 55 percent is comprised of a variety of other family soils.

Bairs family, granitic and mixed alluvium soils are very deep, have a gravelly loamy coarse sand surface layer and are well drained. Torriorthentic Haploxerolls are formed in material weathering from mixed and basalt rocks with a gravelly sandy loam surface layer and are deep, somewhat excessively drained.

### **4. Delaney-Brantel families-Vitrantic Torriorthents**

The soils in this map unit formed in material that weathered from pumice and tuff. They are on mountainsides, hillsides, hilltops, lake terraces, upland valleys, alluvial fans, upland flats, mesas and bottomlands that have slopes of 0 to 60 percent. This unit makes up about 16 percent of the survey area.

Approximately 32 percent of the unit is Delaney family, 26 percent is Brantel family soils, 26 percent is Vitrantic Torriorthents. The remaining 16 percent is comprised of a variety of other family soils and rock outcrop.

Delaney family, pumice and tuff soils are moderately deep to deep, have a gravelly loamy sand surface layer and are somewhat excessively drained. Brantel family soils are formed in pumice and tuff with a coarse sand surface layer and are somewhat excessively drained. Vitrantic Torriorthents has similar characteristics but has a sand surface layer.

#### ***Soils in the Frigid Soil Temperature Regime***

In the frigid soil temperature regime the mean annual soil temperature is 32 to 47°F. The difference between mean winter and mean summer soil temperature is more than 9°F. The mean annual summer soil temperature is higher than 47°F.

The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, ash and tuff. The elevation ranges from 5,000 to 13,000 feet. The soils are on mountainsides, hillsides, basalt

flows, mountain toeslopes, moraines, hilltops, ridges and colluvial slopes. Slopes range from 0 to 90 percent. Annual precipitation ranges from 8 to 45 inches.

The soils in this group are shallow to very deep and are well drained to excessively drained. The plant species are big sagebrush, Jeffrey pine, red fir, lodgepole pine, singleleaf Pinyon and western juniper. The areas are used mainly for watershed, wildlife habitat, recreation, and fuelwood production.

### **5. Rock outcrop-Lithic Cryorthents-Corbett-Nanamkin families**

The soils in this map unit formed in material that weathered from mixed granitic, rhyolitic and andesitic rocks. They are on mountainsides, ridges and colluvial slopes of slopes of 0 to 90 percent. This unit makes up about 17 percent of the survey area.

Approximately 39 percent of the map unit is Rock outcrop-Lithic Cryorthents, 18 percent is Corbett family soils and 13 percent is Nanamkin family soils. The remaining 30 percent is comprised of minor components of a variety of other family soils and rock outcrop.

Lithic Cryorthents, weathered from granitic materials are shallow, have a extremely stony loamy sand surface layer and are well drained. Corbett family soils are formed in granitic, rhyolitic and andesitic materials with a gravelly loamy sand surface layer and are somewhat excessively drained. The Nanamkin family has similar characteristics as Lithic Cryorthents and the Corbett family, but has a very cobbly loamy sand surface texture.

### **6. Neuske-Bearskin-Haypress families**

The soils in this map unit formed in material that weathered from granitic, basalt, metasedimentary and mixed rock. They are on hillsides, basalt flows, mountain toeslopes and mountainsides, on slopes of 0 to 90 percent. This unit makes up about 7 percent of the survey area.

Approximately 23 percent of the unit is Neuske family soils, 19 percent is Bearskin family soils, 14 percent is Haypress family soils. The remaining 44 percent is comprised of a variety of other family soils and rock outcrop.

Neuske family, basaltic and mixed granitic soils are moderately deep to very deep, have a gravelly fine sandy loam and loamy coarse sand surface layer and are well drained. Bearskin family soils are formed in material weathering from basalt and metasedimentary rocks with a gravelly loamy fine sand surface layer and are shallow and well drained. Haypress family, granitic, basalt and

mixed soils are very deep, have a loamy sand surface layer and are somewhat excessively drained.

### **7. Vitrandic Xerorthents-Cozetica family-Vitrandic Haploxerolls**

The soils in this map unit formed in material that weathered from pumice and ash. They are on hillsides, hilltops, moraines, mountain basins, mountain flats, benches, mountain toeslopes and mountainsides that have slopes of 0 to 70 percent. This unit makes up about 12 percent of the survey area.

Approximately 76 percent of the unit is Vitrandic Xerorthents, 14 percent is Cozetica family soils, and 10 percent is Vitrandic Haploxerolls.

Vitrandic Xerorthents, pumice soils are very deep, have a loamy coarse sand surface layer and are somewhat excessively drained. Cozetica family soils are formed in pumice and ash with a gravelly sand surface layer and are somewhat excessively drained. Vitrandic Haploxerolls has similar characteristics but has a gravelly coarse sand surface layer.

#### *Soils in the Cryic Soil Temperature Regime*

In the cryic soil temperature regime the mean annual soil temperature is 32 to 47°F. The mean annual summer soil temperature is lower than 47°F if a litter layer is present and the soil is not saturated during some portion of the summer and 59°F if a litter layer is not present. Conversely, if the soil is saturated for a portion of the summer then the soil temperature must be lower than 43°F if a litter layer is present and 55°F if not.

The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, rhyolite, obsidian and ash. The elevation ranges from 7,400 to 13,400 feet. They are on mountainsides, hillsides, mountaintops, hilltops, terraces, and mountain basins. Slopes range from 0 to 70 percent. Annual precipitation ranges from 12 to 45 inches.

Associated plant species are big sagebrush, whitebark pine, red fir, lodgepole pine, Jeffrey pine, sedges and grasses. The areas are used mainly for watershed, wildlife habitat, recreation, and fuelwood production.

### **8. Stecum-Labshaft families**

The soils in this map unit formed in material that weathered from granitic, metavolcanic, metasedimentary and mixed rocks. They are on mountainsides, mountain tops, moraines and terraces of slopes of 0 to 70 percent. This unit makes up about 8 percent of the survey area.

Approximately 69 percent of the map unit is Stecum family soils and 13 percent is Labshaft family soils. The remaining 18 percent is minor components of a variety of other family soils and rock outcrop.

The Stecum family, weathered from granitic, metavolcanic and metasedimentary materials are moderately deep to very deep, have a very cobbly loamy sand surface layer, and are somewhat excessively drained. Labshaft family soils are formed in mixed rocks with a very gravelly sandy loam surface layer and are well drained.

### **9. Vitrandic Cryorthents-Vitrandic Cryopsamments**

The soils in this map unit formed in material that weathered from pumice, rhyolite and obsidian. They are on hillsides, hilltops, terraces, mountain flats, mountain benches, mountain basins and mountainsides that have slopes of 0 to 60 percent. This unit makes up about 3 percent of the survey area.

Approximately 50 percent of the unit is Vitrandic Cryorthents, and 50 percent is Vitrandic Cryopsamments.

Vitrandic Cryorthents, pumice soils are moderately deep to very deep, have a very gravelly coarse sand surface layer and are somewhat excessively drained. Vitrandic Cryopsamments soils are formed in pumice with a loamy sand surface layer and are somewhat excessively drained.

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119°15'

119°00'

118°45'

118°30'

118°15'

118°00'

38°00'

38°00'

37°45'

37°45'

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37°30'

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36°45'

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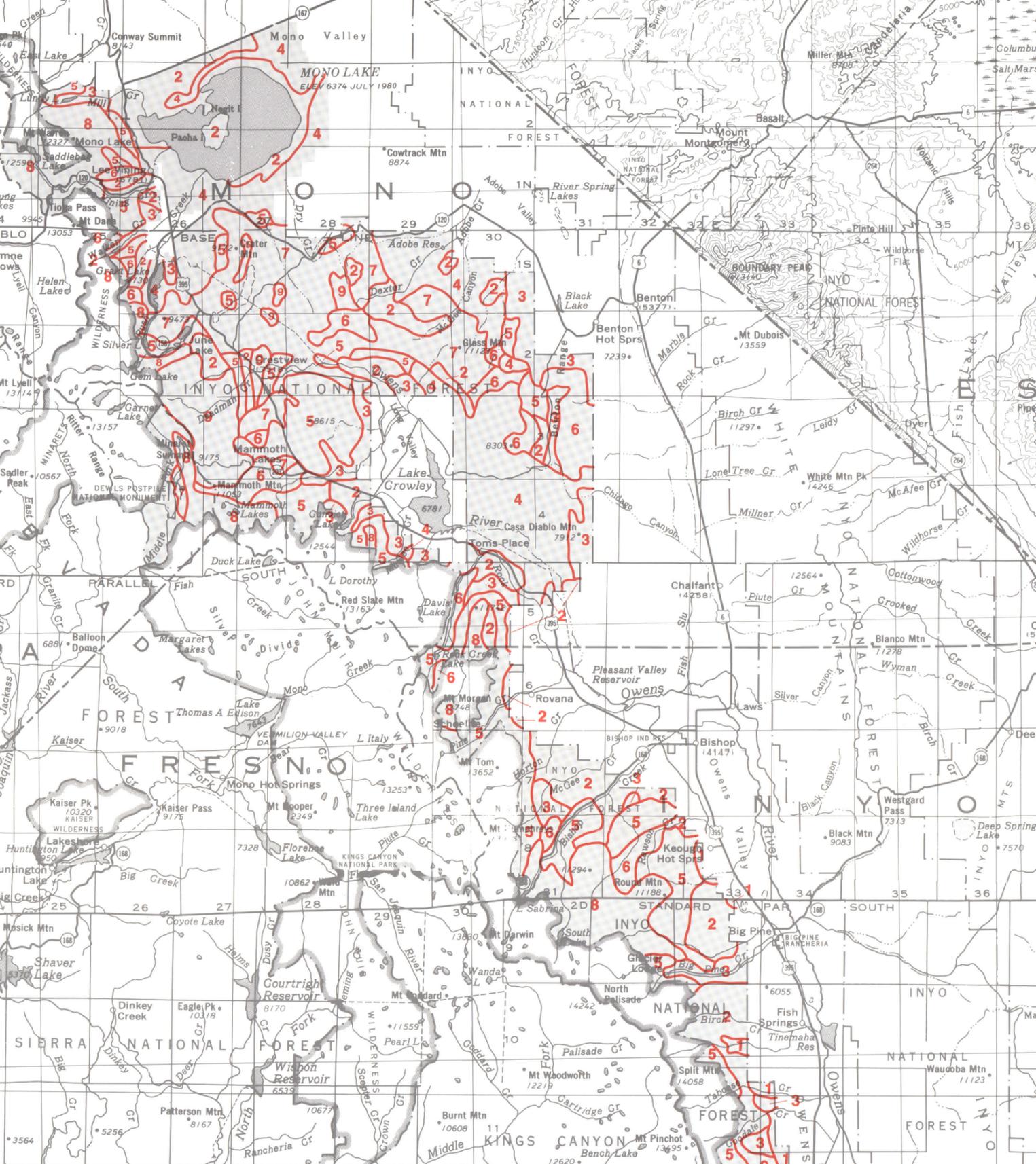
36°30'

36°15'

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**GENERAL SOILS MAP  
WEST HALF  
INYO NATIONAL FOREST, CALIFORNIA**

**LEGEND**

**Soils in the Thermic Soil Temperature Regime**

- 1. Goodale-Lubkin-Whitewolf families

**Soils in the Mesic Soil Temperature Regime**

- 2. Wrango-Berent -Waterman Families- Rock outcrop
- 3. Rock outcrop- Bairs family- Torriorthentic Haploxerolls
- 4. Delaney- Brantel families- Vitrandic Torriorthents

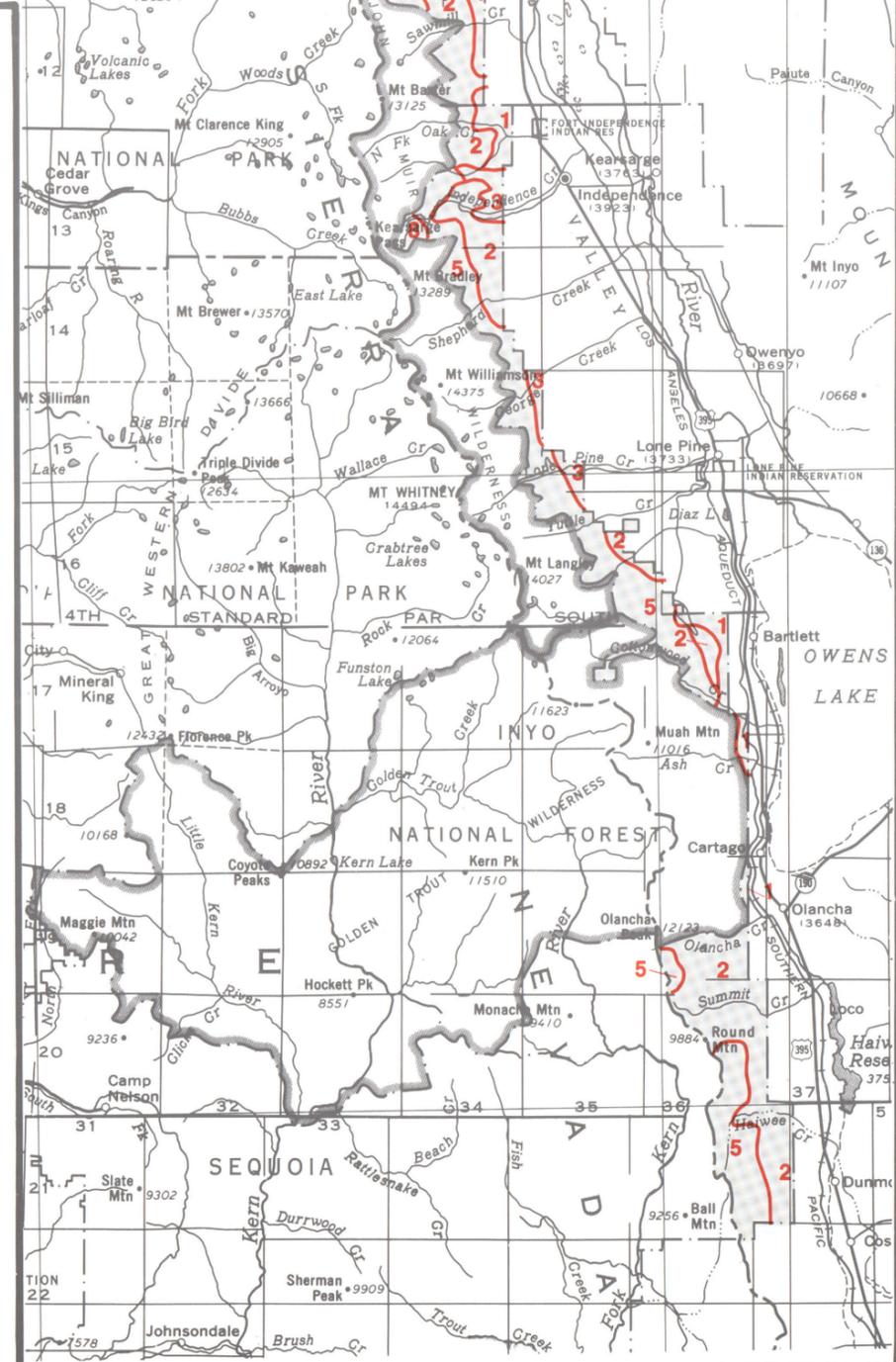
**Soils in the Frigid Soil Temperature Regime**

- 5. Rock outcrop-Lithic Cryorthents- Corbett- Nanamkin families
- 6. Neuske- Bearskin- Haypress families
- 7. Vitrandic Xerorthents- Cozetica family- Vitrandic Haploxerolls

**Soils in the Cryic Soil Temperature Regime**

- 8. Stecum- Labshaft families
- 9. Vitrandic Cryorthents-Vitrandic Cryopsamments

Inyo NF West Half Area Surveyed





## Detailed Soil Map Units

The map units on the soil maps at the back of this report show the kind of soils in the survey area. Table 2 gives the acreage and proportionate extent of each map unit. Each map unit on the soil maps represents an area on the landscape and consists of one or more soils or miscellaneous landtypes for which the unit is named. The map unit descriptions, which are in tabular format, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They can also be used to plan the management needs for those uses.

In this survey, the individual soils (components of map units) were recognized and classified to families or phases of families or to the subgroup level (see "Classification of the Soils"). Soils that have profiles somewhat alike make up a soil family. Soil families are established within a subgroup primarily on the basis of physical and chemical properties that affect use and management. Soils of a family can also differ in slope, wetness, or degree of erosion, and because of such differences, a family is divided into soil phases.

Many map units are made up of two or more major soils. Table 4 lists for each soil, those map units in which the soil occurs as a major component. 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. 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 uses, it was considered impractical to map the soils separately. In addition, some map units include miscellaneous areas as components. The Rock outcrop unit is an example; it has little or no soil and supports little or no vegetation.

### Definitions and Criteria

The following are explanations of entries used in detailed soil map unit descriptions.

**Map unit symbol and name.** A numerical symbol is used to designate areas of each map unit on the soil maps. The symbol corresponds to the symbol preceding the map unit name in the map unit descriptions. The map unit consists of soil components or miscellaneous areas or both.

**Elevation.** The range of elevation (in feet) for the soil map unit.

**Annual precipitation.** The range of average annual precipitation (in inches) for the map unit.

**Soil map unit components** consist mostly of soil families but may include subgroups or higher soil taxa and miscellaneous land types.

**Approximate proportion** is the approximate percentage of each soil component or miscellaneous land type making up the map unit.

**Landscape position** describes the type of landform or surface on which the components are found.

**Slope** is the slope range for each soil component, expressed in percent slope.

**Typical vegetation series** is listed for each soil component. A series is a natural vegetation unit that has a common dominant species or set of species. Vegetation series are part of a hierarchical stratification used in the Vegetation Classification system for California (CALVEG)(4). They are:

*Mixed Conifer - Fir Series* - This series consists of a number of conifer species, including white fir (*Abies concolor*), red fir (*Abies magnifica*), Jeffrey pine (*Pinus jeffreyi*). These mixed conifers occur within an elevation range of (6,000 to 9,000) feet. The lower elevations within this range are primarily dominated by white fir and Jeffrey pine. In higher elevations, red fir becomes more dominant. However, Jeffrey pine and white fir continue to occur in decreasing amounts. Greenleaf manzanita (*Arctostaphylos patula*), bitterbrush (*Purshia tridentata*), and big sagebrush (*Artemisia tridentata*) are associated understory shrubs.

*Jeffrey Pine Series* - This Series, dominated by Jeffrey pine (*Pinus jeffreyi*) occurs in Mono County, north and south of Mono Lake, on rolling hills, lower elevation mountain uplands, and above flats. Associated vegetation are ponderosa pine (*Pinus ponderosa*), singleleaf Pinyon (*Pinus monophylla*), lodgepole pine (*Pinus contorta* var. *murrayana*), red fir (*Abies magnifica*), juniper (*Juniperus occidentalis*), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and greenleaf manzanita (*Arctostaphylos patula*).

*Red Fir Series* - This series is within an elevational range of (6,500 feet to greater than 9,000 feet) in a band just above the Mixed Conifer - Fir Series. red fir (*Abies magnifica*) grows in pure, dense stands, but on rocky ridgetops; red fir shares dominance with lodgepole pine (*Pinus contorta* var. *murrayana*) and white fir (*Abies concolor*). Jeffrey pine (*Pinus jeffreyi*) is also an associated conifer species. In dense red

fir stands with heavy litter accumulation, understory plants do not occur. In more open stands, greenleaf manzanita (*Arctostaphylos patula*), bitterbrush (*Purshia tridentata*), and big sagebrush (*Artemisia tridentata*) are the dominant understory shrubs.

*Lodgepole Pine Series* - The Lodgepole Pine (*Pinus contorta* var. *murrayana*) Series occurs at elevations from 6,500 feet to greater than 10,000 feet, on frigid and cryic soils. It occurs intermingled with the Jeffrey pine, red fir, whitebark pine and Mixed Conifer Series, in dense, pure stands in swales with abundant year around moisture, or as scattered individual trees on very dry soils. Lodgepole pine (*Pinus contorta* var. *murrayana*) is an invader species, and as the microsite changes, it may be replaced by Jeffrey pine (*Pinus jeffreyi*) or red fir (*Abies magnifica*).

*Whitebark Pine Series* - This series, dominated by whitebark pine (*Pinus albicaulis*), occurs on high windswept ridges at treeline. In these areas, a krummholzed form is common. This Series also grows in areas of glacial scouring where development is poor. whitebark pine associates with lodgepole pine (*Pinus contorta* var. *murrayana*) and foxtail pine (*Pinus balfouriana*).

*Western White Pine Series* - western white pine (*Pinus monticola*) occurs in small groves on high elevation, dry, windblown slopes. On better soils, it associates with red fir (*Abies magnifica*), mountain hemlock (*Tsuga mertensiana*) and lodgepole pine (*Pinus contorta* var. *murrayana*).

*Singleleaf Pinyon Series* - On the dry, east slopes of the southern Sierra and north of Mono Lake, singleleaf Pinyon (*Pinus monophylla*) pine dominates in open woodlands. Associated with singleleaf Pinyon is western juniper (*Juniperus occidentalis*), Utah juniper (*J. utahensis*), and curleaf mountain mahogany (*Cercocarpus ledifolius*). Associated understory species include basin sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and rabbitbrush (*Chrysothamnus parryi*). At low elevations of mountain areas near Lee Vining, singleleaf Pinyon becomes the sole dominant conifer.

*Quaking Aspen Series* - The Quaking Aspen (*Populus tremuloides*) Series occurs at high elevations as an indicator of moist conditions. Groves of quaking aspen associate with red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta* var. *murrayana*), mountain hemlock (*Tsuga mertensiana*), basin sagebrush (*Artemisia tridentata*), and high elevation meadow Series. The elevational range is from (6,500 feet to 10,000 feet). At higher elevations, under exposed conditions, quaking aspen stands will maintain a shrub-like appearance and never reach a tree-like form.

*Willow Series* - This series, dominated by willow (*Salix* spp.), occurs on the east side of the Sierra Nevada where stream or pond conditions provide sufficient moisture. Associates of this stringer-like Series include water birch (*Betula occidentalis*), wild rose (*Rosa woodsii*), aspen (*Populus* spp.), and other water tolerant species.

*Greenleaf Manzanita Series* - The Greenleaf Manzanita (*Arctostaphylos patula*) Series grows at high elevations. Geographically associated Series include the Mixed Conifer - Fir, and the Red Fir Series. Greenleaf manzanita occasionally is in association with Jeffrey pine (*Pinus jeffreyi*) and lodgepole pine (*Pinus contorta* var. *murrayana*). This manzanita species sprouts after fires, and seeds are viable for many years. After a fire or disturbance, seed germination plus sprouting allows the occupancy of the site after about five years.

*Saltbush Series* - Both spiny saltbush (*Atriplex confertifolia*) and fourwing saltbush (*A. canescens*) occur from northern Owens Valley to Kern County. spiny saltbush generally is located on dry alkaline plains and hills on the east slopes of the Sierra Nevada in Mono, Kern, and Inyo Counties. Fourwing saltbush may be abundant on saline desert flats and washes in the same counties. Associated species include sagebrush, creosote, and grasses.

*Big Sagebrush Series* - Big sagebrush or basin sagebrush (*Artemisia tridentata*), the dominant of this Series, generally occurs on dry slopes and plains from (4,000 feet to 10,600 feet) east of the Sierran crest. Basin sagebrush is usually found on frigid soils with a lack of profile development. bitterbrush (*Purshia tridentata*) may occur as a codominant. Basin sagebrush also occurs with Jeffrey pine (*Pinus jeffreyi*) and mountain mahogany (*Cercocarpus ledifolius*) on gentle to steep slopes without rock outcrops. Other associates include juniper (*Juniperus* spp.), greenleaf manzanita (*Arctostaphylos patula*), rabbitbrush (*Chrysothamnus* spp.), squirreltail (*Sitanion hystrix*), fescue (*Festuca* spp.), Kentucky bluegrass (*Poa pratensis*), and sagebrush (*A. nova*, *A. arbuscula*, and *A. rothrockii*).

*Low Sagebrush Series* - Low sagebrush (*Artemisia arbuscula*) generally is restricted to basins with clay or saline-alkaline soils which are intermittently flooded. Low sagebrush also occurs on terraces with hardpan or heavy clay conditions. When in association with bitterbrush (*Purshia tridentata*), it reflects a mosaic of poorly drained soils, with the bitterbrush on deeper soils and low sagebrush on shallow soils. Black sagebrush (*Artemisia arbuscula nova*) also occurs on harsh sites, and is an indicator of limestone-dominated alluvial fans. Associated plants include the same species associated with the Basin Sagebrush Series.

**Bitterbrush Series** - In the Mono Basin, southeast of Mono Lake and in the headwaters of the Owens River, bitterbrush (*Purshia tridentata*) becomes the dominant of this Series. This high value forage species occurs at higher elevations than saltgrass (*Distichlis spp.*) meadows and below montane slopes with basin sagebrush (*Artemisia tridentata*), Pinyon pine (*Pinus monophylla*), and juniper (*Juniperus spp.*). Bitterbrush may also be locally dominant when associated with basin sagebrush.

**Curlleaf Mountain Mahogany Series** - This Series occurs on gently to steeply sloping mountain uplands and ridgetops, usually in association with rock outcrops. On more xeric sites, curlleaf mountain mahogany (*Cercocarpus ledifolius*) occurs in association with manzanita (*Arctostaphylos spp.*), Idaho fescue (*Festuca idahoensis*), squirreltail (*Sitanion hystrix*), and a few other grasses and forbs. On more mesic sites, associates may include juniper (*Juniperus spp.*), scattered Jeffrey pine (*Pinus jeffreyi*), or singleleaf Pinyon (*Pinus monophylla*). This Series may occur in two forms; a shrub form that occurs scattered throughout an area, and a small tree form that occurs in dense thickets.

**Shadscale Series** - Shadscale (*Atriplex confertifolia*) dominates throughout basins of the Mojave Desert, and in valleys southeast of Mono Lake. These basins form pluvial lakes or dry lakes with salt accumulations. Associated species include bud sagebrush (*Artemisia spinescens*), big sagebrush (*Artemisia tridentata*), Nevada ephedra (*Ephedra Nevadensis*), allscale (*Atriplex polycarpa*), Iodine bush (*Allenrolfea occidentalis*), and greasewood (*Sarcobatus vermiculatus*). Shadscale and bud sage are common associates in the Owens Valley.

**Blackbush Series** - This series sometimes called Blackbrush (*Coleogyne ramosissima*), dominates within the Mojave Desert and adjacent montane slopes. Occurrence is on non-saline soils, often beneath scattered Pinyon pine (*Pinus monophylla*). Associated species include hopsage (*Grayia spinosa*), agave (*Agave deserti*), and Mormon tea (*Ephedra spp.*).

**Perennial Grass Series** - Within the Jeffrey pine, red fir and lodgepole pine forests, perennial grasses dominate the openings of poorly developed, drier soils. Many grasses make up this Series (*Poa spp.*, *Bromus tectorum*, *Bromus spp.*, and *Elymus spp.*). Forbs are also included in this highly diverse Series.

On pumice flats in Mono County, perennial dominants include needlegrass (*Stipa elmeri*), squirreltail (*Sitanion spp.*), bluegrass (*Poa spp.*), bentgrass (*Agrostis spp.*), bromegrass (*Bromus spp.*), lupine (*Lupinus duranii*), pussy paws (*Calyptidium umbellatum* var. *caudiciferum*), Hulsea (*Hulsea vestita*), and evening primrose

(*Oenothera xylocarpa*). This series commonly is bordered by the basin sagebrush Series and may include some of its components.

**Sedge - Rush Series** - This Series is composed of sedges (*Carex spp.*) and rushes (*Juncus spp.*) and designates year-long water availability. Perennial grasses, forbs, willows, and lodgepole pine may be associated with the Sedge - Rush Series. This Series represents a much wetter site that does the Perennial Grass Series.

**Pickleweed Series** - Pickleweed (*Salicornia utahensis*) occurs as a dominant adjacent to alkali sinks and in flats above alkali lakes east of the Sierra Nevada. Associated species in the playas and sinks include arrowweed (*Pulchella sericea*), greasewood (*Sarcobatus spp.*), and sea-blite (*Suaeda spp.*).

**Soil profile description** is an abridged version of the more detailed soil profile descriptions in the section "Taxonomic Unit Descriptions". This description combines horizons and includes the thickness, dry color, texture, structure, dry consistence, rock fragment content and reaction (pH). Miscellaneous landtypes are also described here. Included are the following layers:

**Surface Layer.** The uppermost part of the soil, ordinarily removed in tillage, or its equivalent in uncultivated soils. Frequently designated the "A horizon".

**Subsoil.** The soil between the surface layer and the uppermost substratum. The subsoil consists of all parts of the B horizon above a depth of two meters (80 inches) and any part of the A or C horizon between the surface layer and a depth of one meter (40 inches) or a more shallow substratum.

**Substratum.** A layer below a depth of one meter (40 inches), or beneath the solum if the lower part of the solum is between one and two meters (40 to 80 inches) deep. Any part of the solum below two meters (80 inches) is considered substratum. Bedrock, hardpan, and unconsolidated geologic materials that are in contrasting particle-size classes relative to the surface soil or solum are substratum regardless of depth, even within one meter of the ground surface.

**Included Areas** comprise the other kinds of soils in the map unit that are not named as a component part because they constitute too small a percentage of the unit. Included areas are identified because some do affect management significantly and the recognition of all of them will assist with more detailed mapping in the future.

## Management Interpretations

The following are explanations used in the management interpretations for detailed soil map unit descriptions.

**Restrictive Layer depth** is a restrictive layer which occurs within the upper 60 inches of the soil profile. Restrictive layers impede or stop downward water movement and root penetration. Types of restrictive layers in this report are: duripan or hardpan (DP), fractured bedrock (FB), hard unfractured bedrock (HB) and parialithic contact (PC).

**Effective rooting depth** is the depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. The classes of effective rooting depth are:

Very Shallow	0 to 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	greater than 60 inches

**Available water capacity (AWC)** is the capacity of the soil to store water for use by most plants. It commonly is defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is expressed as total inches of water within the effective rooting depth or to a depth of 60 inches. The following four classes of AWC are used in this survey:

Very low	to 2 inches
Low	2 to 4 inches
Moderate	4 to 8 inches
High	more than 8 inches

**Water retention class** is based on the available water capacity for plants of a typical soil profile to a depth of 20 inches or to bedrock, whichever is less. This moisture content is used in evaluating soils for revegetation according to the probability of survival of seedlings.

There are three water retention classes. The soils in class 1 have an available water capacity of more than 2.4 inches. Plantings on these soils have a high probability of survival. The soils in class 2 have an available water capacity of 1.2 to 2.4 inches. Some problems will be encountered in establishing plantings. The soils in class 3 have an available water capacity of less than 1.2 inch. Plantings on these soils have little chance of success unless intensive management or mitigation measures are applied.

**Hydrologic soil groups** are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned one of four groups. The soils are grouped according to the intake of water when they are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

*Group A.* Low runoff potential. Soils having high rates of infiltration and water transmission when wet. They are mostly deep, well drained to excessively drained sands and gravel.

*Group B.* Moderately low runoff potential. Soils having moderate rates of infiltration and water transmission when wet. They are mostly moderately-deep to deep, moderately well-drained and well-drained soils, moderately fine to moderately coarse-textured and have moderately slow to moderately rapid permeability.

*Group C.* Moderately high runoff potential. Soils having slow rates of infiltration and water transmission when wet. They belong mostly to one of two categories. Those in the first category are mostly well drained and moderately well drained soils that have a slowly or very slowly permeable layer (such as claypan or hardpan or massive bedrock) at moderate depth (20-40 inches). Those soils in the second category generally have moderately fine or fine textures or a moderately high water table and may be somewhat poorly drained. This group also includes shallow soils over hard but highly fractured bedrock that allows moderate water transmission.

*Group D.* High runoff potential. Soils having very slow rates of infiltration and water transmission when wet. They are mostly fine-textured soils that have high shrink-swell potential, soils that have a permanently high water table, soils that have a claypan or a clay layer near the surface, or shallow soils over impervious material.

Some of the soil subgroups (for example, C-B for Lithic Cryorthents) were given two ratings because of their wide range of characteristics.

**Permeability** is the quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. The measure here is based on the least pervious soil horizon. Terms describing permeability are: Very slow (less than 0.06 inch), slow (0.06 to 0.20 inches), moderately slow (0.2 to 0.6 inches), moderate (0.6 to 2.0 inches),

moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20.0 inches), and very rapid (more than 20.0 inches).

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

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

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

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

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

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

*Poorly drained.* Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, or nearly continuous rainfall, or a combination of these.

*Very poorly drained.* Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils commonly are level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

## Maximum Erosion Hazard

Many land use activities have the potential to cause erosion rates to exceed natural soil erosion or soil formation rates. Potential consequences of accelerated erosion include reductions in the productive capacity of the soil and adverse effects on water quality. Many interrelated factors are evaluated in an EHR system to determine whether land use activities would cause accelerated erosion, and to what degree accelerated erosion would cause adverse effects. It is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, nor 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.

**Erosion factor K** indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on the percentage of silt, sand and organic matter (up to 4 percent) and on the soil structure and permeability. Values of K in the survey area range from 0.05 to 0.37. A higher the value for a soil, the more susceptible the soils is to sheet and rill erosion by water.

**Soil productivity** signifies the assessed ability of soils to supply essential nutrients for plant growth. Current knowledge of critical or threshold nutrient levels for native species is incomplete. The soil criteria used to make these ratings are: soil depth, presence or absence of a mollic epipedon, particle-size class, mineralogy, and reaction classes. The ratings are: very low, low, moderate, and high.

**Soil manageability.** Certain features of the land affect the relative ease of management with mechanized equipment. Soil manageability classification rates soils and their topography on the basis of features that reduce the ease of equipment operations and features that increase the need for soil protection measures.

Soil manageability classes are ratings that are applied to the individual components of a soil map unit. Manageability classes are useful for providing specific information about individual soils. Because map units may contain soils with contrasting class ratings, soil manageability groups are used to provide general ratings that apply to an entire map unit. Manageability groups are useful for providing general information for large areas.

Soil manageability classes are represented by the numerals 1 to 4. Class 1 is the easiest to manage and class 4 is the most difficult. Letter symbols are added to classes 2, 3, and 4 to identify specific soil problems affecting management. Soil manageability classes are described as follows:

Class 1 - Easy to manage. Soils in this class are on stable slopes with gradients ranging up to about 30 percent. They are moderately deep or deep and do not have more than slight management problems. No management option modifiers apply to this class.

Class 2 - Readily manageable. Soils in this class are mostly on slopes of less than 30 percent and have one or more moderate management limitations, such as a moderate erosion hazard.

Class 3 - Moderately difficult to management. Soils in this class are on steep slopes that are mostly between 30 and 60 percent, or they have a major management limitation, or both.

Class 4 - Very difficult to manage. Soils in this class are on very steep slopes (more than 60 percent), or they have two or more other major management limitations.

Letter symbols are used to express the severity of potential problems in soil management. Major management option modifiers are identified by capital letters and moderate management modifiers are indicated by lowercase letters. The criteria and symbols for management option modifiers for each soil characteristic or topographic feature are listed in table 1.

**TABLE 1. - Soil Features Affecting Management**

Soil features	Major modifiers	Moderate modifiers
Slope gradient	G...Mostly more than 60 percent	g...Mostly between 30 and 60 percent
Slope stability	S...Low	s...Moderate
Maximum erosion hazard	E...High or very high	e...Moderate
Soil Depth	D...Less than 10 inches	d...10 to 20 inches
AWC, upper 20 inches	P...Less than 1.2 inches	p...1.2 to 2.4 inches
Wetness	W...Poorly drained	w...Somewhat poorly drained
Rock outcrop or surface boulders	X...More than 15 percent of surface area	x...3 to 15 percent of surface area

Management option modifiers are chosen in the order in which they are listed. More than one symbol can be chosen from each of the following groups: (1) symbols G, S, and E (and their lower case forms); (2) symbols D and P; and (3) symbols W and X. Within each group, symbols for major management limitations take precedence over moderate limitations.

Soil manageability groups are defined by the mix of soil manageability classes that occurs in a soil map unit. They are designated by Roman numerals to distinguish them from soil manageability classes. Only one group applies to a soil map unit, whereas as many classes may apply as there are major components in the map unit. Table 1 displays soil features affecting management and the soil manageability groups in the survey area are defined.

*Group I* - Map unit is predominantly class 1. Less than 20 percent of the unit is class 3 or class 4. The unit may be no more than 50 percent class 2, or combinations of classes 2, 3, and 4.

*Group II* - Map unit is predominantly class 2. Less than 20 percent of the unit is class 4. Less than 50 percent of the unit is class 3 or a combination of classes 3 and 4.

*Group III* - Map unit is predominantly class 3. Less than 40 percent of the unit is class 4.

*Group IV* - Map unit is at least 40 percent class 4.

A soil map unit is placed in the group with the lowest numeral if group definitions allow the unit to be placed in more than one soil manageability group.

**Annual forage production** is an estimate of the total annual production of forage grasses in pounds per acre (air-dry weight). The estimates generally are based on professional judgement because little if any field data or yield studies were available. These estimates can be verified through project monitoring activities and ecosystem classification.

**Forest survey site class** - the timber productivity of the soil components is expressed by the Forest Survey Site Class (FSSC). The FSSC estimated for each soil component is an average over the map unit. Site index values were obtained by using available site index data and appropriate guides for converting into FSSC.

On a specific site in the map unit, FSSC might be more or less than what is given in the report. FSSC is an expression of the volume of bole wood produced on an acre in one year in a normal even-aged stand

at culmination mean annual increment. Below are the seven FSSC's and their corresponding volume in cubic feet per acre:

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

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

**Remarks** - Comments unique to the map unit, important to the management of the map unit, or that add further explanation to something previously stated in this section.

TABLE 2. - Acreage and Proportionate Extent of the Map Units

Map Symbol	Map Unit Name	Percent of Survey area	Acres
101	Vitrandid Cryorthents, ashy - Vitrandid Xerorthents, - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.36	2,841
105	Vitrandid Haploxerolls, 0 to 15 percent slopes . . . . .	0.22	1,766
106	Vitrandid Xeropsamments, 30 to 60 percent slopes . . . . .	0.28	2,211
107	Vitrandid Xeropsamments, warm - Vitrandid Xeror- thents, ashy, warm complex, 0 to 15 percent slopes . . . . .	0.32	2,583
108	Chesaw - Railcity families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.42	3,326
110	Biglake - Chesaw families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.14	1,041
111	Vitrandid Xeropsamments - Corbett family - Rock outcrop complex, 15 to 30 percent slopes . . . . .	0.31	2,460
114	Haypress family - Rock outcrop association, 30 to 60 percent slopes . . . . .	0.50	3,960
115	Vitrandid Haploxerolls, - Vitrandid Xerorthents, ashy, warm complex, 15 to 30 percent slopes . . . . .	0.30	2,350
116	Haypress family, 0 to 15 percent slopes . . . . .	0.08	655
117	Rock outcrop - Rubbleland complex . . . . .	6.58	52,104
121	Vitrandid Haploxerolls, - Vitrandid Xeropsamments, warm complex, 15 to 30 percent slopes . . . . .	0.35	2,810
122	Vitrandid Xerorthents, ashy - Vitrandid Xeropsamments - Vitrandid Cryorthents, ashy complex, 0 to 15 percent slopes . . . . .	1.77	14,026
124	Vitrandid Xerorthents, pumiceous, warm - Vitrandid Haploxerolls, pumiceous - Vitrandid Xerorthents, ashy, warm complex, 0 to 15 percent slopes . . . . .	0.53	4,204
126	Vitrandid Cryorthents, pumiceous - Vitrandid Cryorthents - Vitrandid Xerorthents, pumiceous complex, 0 to 15 percent slopes . . . . .	0.50	3,961
127	Vitrandid Cryorthents, pumiceous - Vitrandid Cryorthents complex, 15 to 30 percent slopes . . . . .	0.24	1,915
131	Corbett family - Vitrandid Xeropsamments, warm - Rock outcrop complex, 15 to 30 percent slopes . . . . .	0.38	3,044
132	Corbett - Railcity families - Rock outcrop complex, 30 to 60 percent slopes . . . . .	1.60	12,575
133	Corbett family - Rock outcrop - Railcity family complex, 15 to 30 percent slopes . . . . .	0.46	3,673
134	Vitrandid Xeropsamments, warm, 0 to 15 percent slopes . . . . .	0.44	3,474
136	Vitrandid Cryopsamments, 0 to 15 percent slopes . . . . .	0.29	2,277
137	Vitrandid Xerorthents, pumiceous, warm - Vitrandid Xerorthents, complex, 0 to 30 percent slopes . . . . .	1.00	7,851
138	Vitrandid Xerorthents, pumiceous - Vitrandid Xeropsamments - Rock outcrop complex, 30 to 60 percent slopes . . . . .	1.07	8,511
139	Brantel family, 0 to 15 percent slopes . . . . .	2.60	20,569
140	Cozetica family - Rock outcrop association, 15 to 60 percent slopes . . . . .	1.41	11,194

Map Symbol	Map Unit Name	Percent of Survey area	Acres
142	Brantel family - Rock outcrop complex, 0 to 30 percent slopes . . .	0.62	4,899
143	Vitrantic Xerorthents, pumiceous - Vitrantic Xeropsamments complex, 0 to 15 percent slopes . . . . .	0.33	2,588
144	Cozetica family, 0 to 30 percent slopes . . . . .	0.17	1,295
145	Vitrantic Xeropsamments, warm - Vitrantic Xerorthents, ashy, warm - Vitrantic Cryorthents, ashy complex, 0 to 30 percent slopes . . . . .	0.70	5,518
146	Lakash - Brantel families complex, 0 to 15 percent slopes . . . . .	1.33	10,579
148	Stecum - Salt Chuck families complex, 30 to 75 percent slopes . . . . .	0.44	3,495
149	Nanamkin family - Vitrantic Haploxerolls complex, 15 to 30 percent slopes . . . . .	0.05	407
150	Vitrantic Cryopsamments - Vitrantic Cryorthents, ashy complex, 9 to 30 percent slopes . . . . .	0.44	3,493
151	Vitrantic Xeropsamments, warm - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.60	4,751
152	Vitrantic Cryopsamments - Rock outcrop complex, 15 to 30 percent slopes . . . . .	0.35	2,816
153	Vitrantic Cryopsamments - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.26	2,021
154	Vitrantic Cryorthents, pumiceous - Vitrantic Cryorthents - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.33	2,587
155	Aquandic Endoaquolls, 0 to 5 percent slopes . . . . .	0.04	363
156	Charcol - Cowood families complex, 2 to 30 percent slopes . . . . .	0.07	607
157	Stecum - Guiser families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.69	5,493
158	Stecum - Charcol families - Rock outcrop complex, 30 to 70 percent slopes . . . . .	0.73	5,865
159	Aquic Cryoborolls, 5 to 30 percent slopes . . . . .	0.03	231
160	Haypress family, 30 to 60 percent slopes . . . . .	0.26	2,046
161	Torriorthentic Haploxerolls, 2 to 30 percent slopes . . . . .	0.37	2,946
162	Torriorthentic Haploxerolls - Rock outcrop complex, 2 to 15 percent slopes . . . . .	0.07	584
163	Yellowhills - Brantel families complex, 2 to 5 percent slopes . . . . .	0.22	1,745
164	Vitrantic Xerochrepts - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.10	819
169	Vitrantic Xerofluvents, 0 to 15 percent slopes . . . . .	0.03	259
170	Springmeyer family, 30 to 60 percent slopes . . . . .	0.01	122
171	Sumine family - Rock outcrop complex, 2 to 30 percent slopes . . . . .	0.26	2,010
172	Calpine - Mottsville families association, 2 to 30 percent slopes . . . . .	0.15	1,171
173	Fez family - Vitrantic Xeropsamments complex, 30 to 60 percent slopes . . . . .	0.22	1,728
174	Torriorthentic Haploxerolls - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.35	2,819
175	Calpine family, 5 to 30 percent slopes . . . . .	0.19	1,500
176	Calpine family - Rock outcrop complex, 0 to 15 percent slopes . . . . .	0.22	1,709
177	Torriorthentic Haploxerolls - Mottsville family association, 15 to 60 percent slopes . . . . .	0.20	1,553

Map Symbol	Map Unit Name	Percent of Survey area	Acres
200	Nanamkin family, 2 to 60 percent slopes . . . . .	0.19	1,433
201	Rubbleland - Stecum family - Lithic Cryorthents association, 30 to 80 percent slopes . . . . .	0.16	1,305
203	Chesaw family, 60 to 80 percent slopes . . . . .	0.01	75
204	Nanamkin - Corbett families association, 30 to 60 percent slopes . . . . .	0.05	447
205	Rubbleland - Nanamkin - Glean families complex, 30 to 80 percent slopes . . . . .	0.05	414
206	Stecum - Charcol families - Rock outcrop association, 2 to 50 percent slopes . . . . .	0.03	222
213	Stecum family - Rubbleland complex, 15 to 60 percent slopes . . . . .	0.14	1,036
215	Glean family, 0 to 50 percent slopes . . . . .	0.16	1,263
216	Railcity family - Rock outcrop complex, 2 to 15 percent slopes . . . . .	0.05	419
217	Nanamkin family - Rubbleland complex, 60 to 80 percent slopes . . . . .	0.02	160
218	Rock outcrop - Railcity family association, 30 to 90 percent slopes . . . . .	0.02	128
301	Neuske family, 15 to 30 percent slopes . . . . .	0.08	620
302	Rock outcrop - Abgese - Pass Canyon families complex, 15 to 30 percent slopes . . . . .	0.11	887
303	Rock outcrop - Abgese - Pass Canyon families complex, 30 to 60 percent slopes . . . . .	0.72	5,682
304	Rock outcrop - Abgese - Pass Canyon families complex, 60 to 90 percent slopes . . . . .	0.24	1,862
305	Delaney family - Rock outcrop complex, 0 to 30 percent slopes . . . . .	0.34	2,674
306	Delaney family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.58	4,536
307	Vitrandic Xeropsammments, warm, 15 to 30 percent slopes . . . . .	0.23	1,843
308	Vitrandic Xerorthents - Vitrandic Xerorthents, ashy complex, 30 to 60 percent slopes . . . . .	1.10	8,689
309	Vitrandic Xeropsammments, 15 to 30 percent slopes . . . . .	0.30	2,414
310	Brantel family, 30 to 60 percent slopes . . . . .	0.34	2,671
311	Vitrandic Xeropsammments - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.89	7,083
312	Wrango - Atter families complex, 30 to 60 percent slopes . . . . .	0.05	401
313	Wrango - Atter families complex, 60 to 90 percent slopes . . . . .	0.34	2,680
314	Rock outcrop - Vitrandic Torriorthents, gravelly complex, 30 to 60 percent slopes . . . . .	0.53	4,178
315	Brantel family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.06	473
316	Delaney family - Rock outcrop - Vitrandic Torriorthents, ashy complex, 0 to 30 percent slopes . . . . .	3.16	25,057
317	Vitrandic Torriorthents, gravelly - Brantel family complex, 2 to 30 percent slopes . . . . .	1.65	13,057
318	Fez family, 2 to 15 percent slopes . . . . .	0.01	512
319	Waterman - Sur families - Rock outcrop complex, 15 to 30 percent slopes . . . . .	0.02	1,258
320	Waterman - Sur families - Rock outcrop complex, 30 to 60 percent slopes . . . . .	1.74	13,797
321	Yellowhills family, 2 to 15 percent slopes . . . . .	0.55	4,332
322	Berent family, 15 to 30 percent slopes . . . . .	0.09	726
323	Nanamkin - Bearskin families association, 0 to 30 percent slopes . . . . .	0.11	937

Map Symbol	Map Unit Name	Percent of Survey area	Acres
324	Fez family - Vitrandic Xeropsamments complex, 0 to 30 percent slopes . . . . .	0.39	3,069
325	Pass Canyon - Jaybee families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.52	4,092
326	Basket - Mascamp families complex, 30 to 60 percent slopes . . .	0.53	4,202
327	Wrango family - Rock outcrop complex, 15 to 30 percent slopes . .	0.39	3,087
328	Wrango family - Torriorthentic Haploxerolls complex, 0 to 15 percent slopes . . . . .	4.68	37,083
329	Wrango family - Torriorthentic Haploxerolls complex, 15 to 30 percent slopes . . . . .	1.21	9,590
330	Wrango family - Torriorthentic Haploxerolls complex, 30 to 60 percent slopes . . . . .	0.15	1,114
331	Koehler - Stacy families complex, 0 to 15 percent slopes . . . . .	0.22	1,703
332	Biglake family, 0 to 15 percent slopes . . . . .	0.10	817
333	Bearskin family - Rock outcrop complex, 0 to 30 percent slopes . .	0.40	3,148
334	Rock outcrop - Bearskin family complex, 60 to 90 percent slopes . .	0.26	2,030
335	Neuske - Basket families complex, 30 to 60 percent slopes . . . . .	1.30	10,282
336	Credo - Mascamp families complex, 15 to 60 percent slopes . . . . .	0.30	2,403
337	Vitrandic Xerorthents - Vitrandic Xeropsamments complex, 30 to 70 percent slopes . . . . .	1.73	13,727
338	Ola - Glean families complex, 15 to 30 percent slopes . . . . .	0.37	2,988
339	Wrango family - Rock outcrop complex, 30 to 60 percent slopes . .	0.17	1,312
340	Salt Chuck family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.28	2,201
341	Delaney - Berent families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.72	5,716
342	Lithic Cryorthents - Stecum family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.26	2,079
343	Preston - Pass Canyon families association, 30 to 60 percent slopes . . . . .	0.90	7,161
344	Vitrandic Xerorthents, ashy - Rock outcrop complex, 15 to 30 percent slopes . . . . .	0.07	607
345	Corbett - Nanamkin families - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.23	1,772
346	Atter family, 15 to 60 percent slopes . . . . .	0.55	4,332
347	Nanamkin family - Rock outcrop complex, 15 to 60 percent slopes . .	1.44	11,380
348	Kilburn family, 5 to 30 percent slopes . . . . .	0.25	2,007
349	Rock outcrop - Biglake family complex, 30 to 70 percent slopes . .	0.32	2,550
350	Sur - Kiona families complex, 15 to 60 percent slopes . . . . .	0.74	5,845
351	Mottsville family, 0 to 15 percent slopes . . . . .	0.06	500
352	Rock outcrop - Biglake - Salt Chuck families complex, 30 to 60 percent slopes . . . . .	0.43	3,431
353	Wrango - Berent families - Rock outcrop association, 30 to 60 percent slopes . . . . .	1.63	12,925
354	Berent family - Rock outcrop complex, 30 to 60 percent slopes . .	0.43	3,414
355	Kilburn - Nanamkin families association, 5 to 15 percent slopes . .	0.37	2,922
356	Kilburn - Nanamkin families association, 15 to 30 percent slopes . . . . .	0.15	1,162

Map Symbol	Map Unit Name	Percent of Survey area	Acres
357	Jaybee family, 9 to 30 percent slopes . . . . .	0.04	337
358	Rock outcrop - Wrango family complex, 60 to 90 percent slopes . . . . .	0.08	663
359	Rock outcrop - Powment family complex, 30 to 60 percent slopes . . . . .	0.44	3,461
360	Rock outcrop - Powment family complex, 60 to 90 percent slopes . . . . .	0.99	7,831
361	Wrango - Berent families complex, 2 to 30 percent slopes . . . . .	0.19	1,485
362	Berent family - Xeric Torriorthents complex, 30 to 60 percent slopes . . . . .	0.80	6,322
363	Garlet - Cowood families - Rock outcrop association, 15 to 60 percent slopes . . . . .	0.49	3,841
364	Preston family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.15	1,154
365	Stecum - Garlet families association, 5 to 30 percent slopes . . . . .	0.41	3,257
366	Stecum family - Rock outcrop complex, 2 to 30 percent slopes . . . . .	0.22	1,790
367	Stecum family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	1.84	14,549
368	Bearskin - Mascamp families complex, 15 to 30 percent slopes . . . . .	0.48	3,787
369	Rock outcrop - Lithic Cryorthents - Nanamkin family association, 15 to 60 percent slopes . . . . .	5.80	46,023
370	Kiona family - Rock outcrop complex, 5 to 30 percent slopes . . . . .	0.64	5,045
371	Labshaft - Salt Chuck families - Rock outcrop complex, 15 to 60 percent slopes . . . . .	0.44	3,446
372	Powment - Nanamkin families - Rock outcrop association, 30 to 60 percent slopes . . . . .	1.27	10,064
373	Labshaft family - Rock outcrop complex, 30 to 60 percent slopes . . . . .	0.47	4,000
374	Aquic Haploxerolls, 0 to 9 percent slopes . . . . .	0.32	2,538
375	Deepwell family - Vitrandic Torripsamments association, 2 to 30 percent slopes . . . . .	0.80	6,319
376	Playa . . . . .	0.92	7,330
377	Sonoma - Poole families complex, 0 to 2 percent slopes . . . . .	0.49	3,856
378	Dechambeau - Orecart families complex, 1 to 15 percent slopes . . . . .	0.27	2,169
379	Alamedawell - Deepwell families complex, 2 to 15 percent slopes . . . . .	0.16	1,238
380	Vitrandic Torriorthents, ashy - Vitrandic Haplodurids complex, 0 to 2 percent slopes . . . . .	0.30	2,381
381	Poole family - Aeric Endoaquents complex, 0 to 2 percent slopes . . . . .	0.39	3,086
382	Brantel - Poole families complex, 0 to 5 percent slopes . . . . .	0.33	2,625
383	Orecart - Deepwell families association, 2 to 15 percent slopes . . . . .	0.32	2,558
384	Cumulic Haploxerolls - Typic Fluvaquents association, 0 to 9 percent slopes . . . . .	0.02	140
385	Vitrandic Torriorthents, sodic, 0 to 9 percent slopes . . . . .	0.22	1,758
386	Avalmount family - Rock outcrop complex, 5 to 30 percent slopes . . . . .	0.09	758
387	Garlet - Stecum families complex, 2 to 15 percent slopes . . . . .	0.10	827
400	Goodale - Cartago families complex, 5 to 15 percent slopes . . . . .	0.31	2,463
401	Taboose family - Lava flows complex, 5 to 30 percent slopes . . . . .	0.07	611
402	Bairs family, 15 to 50 percent slopes . . . . .	0.93	7,358
403	Whitewolf - Toquerville families association, 5 to 60 percent slopes . . . . .	0.27	2,128
404	Arizo - Cajon families complex, 0 to 15 percent slopes . . . . .	0.09	742
405	Lubkin - Tinemaha - Spainhower families complex, 5 to 15 percent slopes . . . . .	0.27	2,143
406	Artray - Chesaw families complex, 0 to 5 percent slopes . . . . .	0.22	1,766

Map Symbol	Map Unit Name	Percent of Survey area	Acres
407	Xerofluvents, 0 to 5 percent slopes . . . . .	0.01	66
408	Dechambeau family, 2 to 5 percent slopes . . . . .	0.03	274
409	Artray family, 2 to 9 percent slopes . . . . .	0.01	97
410	Watterson family - Torriorthentic Haploxerolls complex, 5 to 15 percent slopes . . . . .	0.18	1,451
411	Sherwin - Buscones families complex, 0 to 15 percent slopes . . . . .	0.34	2,729
412	Rock outcrop - Buscones family complex, 0 to 15 percent slopes . . . . .	0.04	333
413	Wrango - Pizona families complex, 5 to 30 percent slopes . . . . .	0.33	2,650
---	Water . . . . .	5.30	41,292
---	Unmapped (Other lands) . . . . .	4.47	34,614

**101 - Vitrandic Cryorthents, ashy - Vitrandic Xerorthents - Rock outcrop complex,  
30 to 60 percent slopes**

Elevation: 8,200 to 9,400 feet      Annual Precipitation: 15 to 45 inches

Soil Map Unit Components	<b>Vitrandic Cryorthents, ashy</b>	<b>Vitrandic Xerorthents</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	35 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides and Benches	Mountainsides and Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Red Fir	Red Fir	Barren

**Soil Profile Description**

Surface Layer	0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0	1 to 0 inch; decomposing Red Fir & Jeffrey Pine needles, twigs & small branches  0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand; massive; pH 6.0 to 7.0	4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0	—

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (3.4 inches)	Very Low (0.8 inches)	—
Water Retention Class	2 (1.5 inches)	3 (0.3 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.15	0.10	—
Soil Productivity	Low	Very Low	—
Soil Manageability			
Group	III	IV	—
Class	3Egp	4EPg	—
Annual Forage Production (lb/acre)	200 to 400	< 200	—
Forest Survey Site Class	5-7	5-7	—

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments, 15 to 30 percent slopes, on some southerly and westerly-facing mountain benches; Vitrandic Cryorthents, Vitrandic Xerorthents ashy & Vitrandic Cryopsamments. Included areas make up approximately 30 percent of the map unit area.

## 105 - Vitrandic Haploxerolls, 0 to 15 percent slopes

Elevation: 7,400 to 8,000 feet

Annual Precipitation: 12 to 15 inches

### Soil Map Unit Components

Approx Proportion

### Vitrandic Haploxerolls, warm

75 percent

Landscape Position

Low Hillsides

Slope

0 to 15 percent

Typical Vegetation

Jeffrey Pine

### Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

Subsoil

—

Substratum

10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.4 inches)

Water Retention Class

3 (1.1 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

300 to 500

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Haypress family, in valley bottoms, Vitrandic Xerorthents, warm, & Vitrandic Haploxerolls, pumiceous. Included areas make up approximately 25 percent of the map unit area.

## 106 - Vitrandic Xeropsamments, 30 to 60 percent slopes

Elevation: 7,900 to 8,700 feet

Annual Precipitation: 15 to 30 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Vitrandic Xeropsamments

75 percent

Mountainsides

30 to 60 percent

Red Fir

### Soil Profile Description

Surface Layer

2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.15

Soil Productivity

Low

Soil Manageability

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

4-6

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, 15 to 30 percent slopes, on toeslope Vitrandic Xerorthents & the Chesaw family. Included areas make up approximately 25 percent of the map unit area.

**107 - Vitrandic Xeropsamments, warm - Vitrandic Xerorthents, ashy, warm complex,  
0 to 15 percent slopes**

Elevation: 7,200 to 8,300 feet      Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	<b>Vitrandic Xeropsamments, warm</b>	<b>Vitrandic Xerorthents, ashy, warm</b>
Approx Proportion	50 percent	25 percent
Landscape Position	Mountain Sand Flats, Terraces & Depressions	Mountain Flats & Basins
Slope	0 to 15 percent	0 to 15 percent
Typical Vegetation	Big Sagebrush	Big Sagebrush

**Soil Profile Description**

Surface Layer	0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0	1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts
Subsoil	—	—
Substratum	1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5	0 to 16 inches; grayish brown loamy coarse sand, gravelly loamy sand & gravelly loamy coarse sand; weak granular structure; soft; pH 5.1 to 5.6 16 to 60 inches; white & pale yellow very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.7 inches)	Very Low (1.9 inches)
Water Retention Class	2 (1.3 inches)	3 (1.0 inches)
Hydrologic Soil Group	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low
Erosion Factor (k)	0.20	0.15
Soil Productivity	Very Low	Low
Soil Manageability		
Group	II	III
Class	2p	3P
Annual Forage Production (lb/acre)	< 200	200 to 400
Forest Survey Site Class	5-6	5

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xerorthents, ashy, Vitrandic Xerorthents, Vitrandic Xerorthents, warm & Vitrandic Xeropsamments; Kiona family, 15 to 30 percent slopes, on hillsides adjacent to terraces; and basalt Rock outcrop. Included areas make up approximately 25 percent of the map unit area.

## 108 - Chesaw - Railcity families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,600 to 10,400 feet      Annual Precipitation: 12 to 35 inches

Soil Map Unit Components	Chesaw family	Railcity family	Rock outcrop, rhyolitic
Approx Proportion	35 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Red Fir	Jeffrey Pine	Barren

### Soil Profile Description

Surface Layer	Chesaw family	Railcity family	Rock outcrop
	1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
	0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5	0 to 14 inches; grayish brown & light grayish brown gravelly extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5	
Subsoil	—	—	—
Substratum	13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (2.0 inches)	Very Low (1.7 inches)	—
Water Retention Class	3 (1.0 inches)	3 (0.5 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	Very Rapid (20+ in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.10	0.05	—
Soil Productivity	Low to Moderate	Very Low	—
Soil Manageability Group	III	III	—
Class	3Pgex	3Pgex	—
Annual Forage Production (lb/acre)	300 to 600	< 200	—
Forest Survey Site Class	NC	6-7	—

### Included Areas & Remarks

Included in this map unit are small areas of the Haypress & Corbett families & Vitrandic Xero- psammets; Chesaw & Railcity families, on 60 to 80 percent slopes; a soil similar to the Ola family, but with lighter surface colors & high amounts of lime, 0 to 30 percent slopes, in valleys; a soil similar to the Chesaw family, but with less base saturation, 0 to 30 percent slopes, on moraines & glacial outwash fans; and a soil similar to the Railcity family, but with an 8 to 12 inch pumice overburden. Included areas make up approximately 30 percent of the map unit area.

## 110 - Biglake - Chesaw families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,400 to 8,800 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components	<b>Biglake family</b>	<b>Chesaw family</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	40 percent	20 percent	20 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Jeffrey Pine	Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	0 to 15 inches; grayish brown coarse sand; weak granular structure; soft; pH 7.0	1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems  0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants
Subsoil	—	—	—
Substratum	15 to 60 inches; brown & yellowish brown gravelly & extremely cobbly coarse sand; weak & moderate subangular blocky structure; soft; pH 7.0	13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (1.5 inches)	Low (2.0 inches)	—
Water Retention Class	3 (0.8 inches)	3 (1.0 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Very Rapid (20+ in./hr.)	Mod. Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.10	0.10	—
Soil Productivity	Low	Low to Moderate	—
Soil Manageability			
Group	III	III	—
Class	3Pgex	3Pgex	—
Annual Forage Production (lb/acre)	200 to 600	300 to 600	—
Forest Survey Site Class	5-6	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Biglake family, but with few rock fragments, and shallow to soft bedrock, on mountainsides, near rock outcroppings; and a soil similar to the Chesaw family, but with few rock fragments, and shallow to hard bedrock, on mountainsides, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

**111 - Vitrandic Xeropsamments - Corbett family - Rock outcrop complex,  
15 to 30 percent slopes**

Elevation: 7,800 to 9,600 feet      Annual Precipitation: 12 to 35 inches

**Soil Map Unit Components**

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic  
Xeropsamments**

25 percent

Mountainsides

15 to 30 percent

Red Fir

**Corbett family**

25 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

**Rock outcrop,  
rhyolitic**

15 percent

Mountainsides & Ridges

—

Barren

**Soil Profile Description**

Surface Layer

2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants

Subsoil

—

—

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5

—

52 inches; soft rhyolitic tuff

**Soil Properties**

Restrictive Layer Depth

Greater than 60 inches

52 inches (FB)

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Moderate (4.4 inches)

Low (2.4 inches)

—

Water Retention Class

2 (1.4 inches)

3 (1.1 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

Low to Moderate

—

Erosion Factor (k)

0.15

0.17

—

Soil Productivity

Low

Very Low

—

Soil Manageability

Group

II

III

—

Class

2epx

3Pex

—

Annual Forage Production (lb/acre)

200 to 400

< 200

—

Forest Survey Site Class

4-6

5-7

—

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments & the Corbett family, 30 to 60 percent slopes; a soil similar to the Corbett family, but shallow to hard bedrock; Vitrandic Xerorthents, ash, 30 percent slopes; the Haypress 60 percent slopes; the Chesaw family, 30 to 60 percent slopes; and the Railcity family, 30 to 60 percent slopes. Included areas make up approximately 35 percent of the map unit area.

## 114 - Haypress family - Rock outcrop association, 30 to 60 percent slopes

Elevation: 7,500 to 8,900 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components	<b>Haypress family, warm</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	55 percent	15 percent
Landscape Position	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	—
Typical Vegetation	Bitterbrush & Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	1/4 to 0 inch; decomposing Jeffrey Pine & plant parts	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
	0 to 22 inches; dark grayish brown & brown gravelly loamy coarse sand; moderate granular structure; soft; pH 6.1	
Subsoil	—	—
Substratum	22 to 60 inches; brown gravelly & very gravelly loamy coarse sand; moderate granular structure; soft; pH 6.5	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (2.8 inches)	—
Water Retention Class	3 (1.1 inches)	—
Hydrologic Soil Group	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	—
Erosion Factor (k)	0.13	—
Soil Productivity	Low to Moderate	—
Soil Manageability		
Group	IV	—
Class	4EPXg	—
Annual Forage Production (lb/acre)	300 to 500	—
Forest Survey Site Class	7	—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Haypress family, but less than 20 inches to hard bedrock, on mountainsides, near rock outcroppings; a soil similar to the Haypress family, but less than 20 inches to soft bedrock, on mountainsides, near rock outcroppings; & the Fez & Nanamkin families. Included areas make up approximately 30 percent of the map unit area.

**115 - Vitrandic Haploxerolls - Vitrandic Xerorthents, ashy, warm complex,  
15 to 30 percent slopes**

Elevation: 7,300 to 8,000 feet      Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	<b>Vitrandic Haploxerolls, warm</b>	<b>Vitrandic Xerorthents, ashy, warm</b>
Approx Proportion	40 percent	30 percent
Landscape Position	Mountainsides	Mountainsides
Slope	15 to 30 percent	15 to 30 percent
Typical Vegetation	Jeffrey Pine	Jeffrey Pine

**Soil Profile Description**

Surface Layer	1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts	1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts
	0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5	0 to 16 inches; grayish brown loamy coarse sand, gravelly loamy sand & gravelly coarse loamy sand; weak granular structure; soft; pH 5.1 to 5.6
Subsoil	—	—
Substratum	10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0	16 to 60 inches; white & pale yellow very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.4 inches)	Very Low (1.9 inches)
Water Retention Class	3 (1.1 inches)	3 (1.0 inches)
Hydrologic Soil Group	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low to Moderate
Erosion Factor (k)	0.10	0.15
Soil Productivity	Low to Moderate	Low
Soil Manageability Group	III	III
Class	3P	3Pe
Annual Forage Production (lb/acre)	300 to 500	200 to 400
Forest Survey Site Class	NC	5-6

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Haploxerolls, pumiceous & Vitrandic Xerorthents, ashy, warm, 30 to 60 percent slopes, on steep mountainsides; Vitrandic Xeropsamments warm, in lower and concave positions on mountainsides; Vitrandic Xerorthents, ashy, on mountainside; and Rock outcrop, rhyolitic & Bishop tuff, on mountainsides. Included areas make up approximately 30 percent of the map unit area.

## 116 - Haypress family 0 to 15 percent slopes

Elevation: 7,500 to 7,800 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	<b>Haypress family</b>
Approx Proportion	80 percent
Landscape Position	Low Hills & Basalt Flows
Slope	0 to 15 percent
Typical Vegetation	Big Sagebrush

### Soil Profile Description

Surface Layer	1/4 to 0 inch; decomposing Jeffrey Pine & plant parts
	0 to 22 inches; dark grayish brown & brown gravelly loamy coarse sand; moderate granular structure; soft; pH 6.1
Subsoil	—
Substratum	22 to 60 inches; brown gravelly & very gravelly loamy coarse sand; moderate granular structure; soft; pH 6.5

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (2.8 inches)
Water Retention Class	3 (1.1 inches)
Hydrologic Soil Group	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively
Max Erosion Hazard	Low
Erosion Factor (k)	0.13
Soil Productivity	Low to Moderate
Soil Manageability Group	III
Class	3P
Annual Forage Production (lb/acre)	300 to 500
Forest Survey Site Class	7

### Included Areas & Remarks

Included in this map unit are small areas of the Chesaw & the Biglake families. Included areas make up approximately 20 percent of the map unit area.

## 117 - Rock outcrop - Rubbleland complex

Elevation: 4,000 to 13,000

Annual Precipitation: 4 to 30 inches

Soil Map Unit Components  
 Approx Proportion  
 Landscape Position  
 Slope  
 Typical Vegetation

### Rock outcrop

60 percent

Mountainsides, Hillsides, Moraines, Ridges & Crests

—

Barren

### Rubbleland

20 percent

Mountainsides, Hillsides & Moraine Sideslopes

—

Barren

## Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

Subsoil

—

—

Substratum

—

—

## Soil Properties

Restrictive Layer Depth

—

—

Effective Rooting Depth (inches)

—

—

Available Water Capacity

—

—

Water Retention Class

—

—

Hydrologic Soil Group

—

—

Permeability (in./hr.)

—

—

Drainage Class

—

—

Max Erosion Hazard

—

—

Erosion Factor (k)

—

—

Soil Productivity

—

—

Soil Manageability

Group

—

—

Class

—

—

Annual Forage Production (lb/acre)

—

—

Forest Survey Site Class

—

—

## Included Areas & Remarks

Included in this map unit are small areas of various soils. These inclusions occur in different combinations & proportions, depending upon parent material, climate & elevation: The Abgese, Bearskin, Berent, Biglake, Brantel, Calpine, Charcol, Chesaw, Corbett, Cowood, Cozetica, Delaney, Fez, Garlet, Guiser, Haypress, Jaybee, Kiona, Labshaft, Nanamkin, Pass Canyon, Powment, Preston, Railcity, Salt Chuck, Stecum, Sumine Sur, Waterman & Wrango families; & Lithic Cryorthents, Torriorthentic Haploxerolls, Vitrandic Cryorthents, Vitrandic Cryopsamments, Vitrandic Haploxerolls, Vitrandic Torriorthents, gravelly, Vitrandic Xerorthents ashy, Vitrandic Xerorthents, Vitrandic Xerorthents pumiceous, Vitrandic Xerorthents pumiceous warm, Vitrandic Xerorthents, warm Vitrandic Xeropsamments, Vitrandic Xeropsamments, warm, and Xeric Torriorthents, shallow. Included areas make up approximately 20 percent of the map unit area.

**121 - Vitrandic Haploxerolls - Vitrandic Xeropsamments, warm complex,  
15 to 30 percent slopes**

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

**Vitrandic Haploxerolls, warm**

50 percent

Hillsides & Low Mountainsides

15 to 30 percent

Perennial Grass

**Vitrandic Xeropsamments, warm**

30 percent

Hillsides & Low Mountainsides

15 to 30 percent

Jeffrey Pine

**Soil Profile Description**

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

Subsoil

—

—

Substratum

10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

**Soil Properties**

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.4 inches)

Low (3.7 inches)

Water Retention Class

3 (1.1 inches)

2 (1.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Moderate

Erosion Factor (k)

0.10

0.20

Soil Productivity

Low to Moderate

Very Low

Soil Manageability

Group  
Class

III  
3P

II  
2epx

Annual Forage Production (lb/acre)

300 to 500

< 200

Forest Survey Site Class

NC

6

**Included Areas & Remarks**

Included in this map unit are small areas of the Fez family, on mountainsides; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 20 percent of the map unit area.

**122 - Vitrandic Xerorthents, ashy - Vitrandic Xeropsamments - Vitrandic Cryorthents, ashy complex,  
0 to 15 percent slopes**

Elevation: 6,800 to 8,600 feet      Annual Precipitation: 10 to 35 inches

Soil Map Unit Components	<b>Vitrandic Xerorthents, ashy</b>	<b>Vitrandic Xeropsamments</b>	<b>Vitrandic Cryorthents, ashy</b>
Approx Proportion	30 percent	20 percent	15 percent
Landscape Position	Mountainsides, Mountain Benches & Hillsides	Mountain Flats, Mountainsides, Hillsides & Glacial Outwash	Mountain Flats & Open Areas
Slope	0 to 15 percent	0 to 15 percent	0 to 15 percent
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Lodgepole Pine

**Soil Profile Description**

Surface Layer	1 to 0 inch; decomposing Jeffrey Pine & Red Fir needles, twigs & chips	2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs	0 to 7 inches; grayish brown & pale brown gravelly sand; massive soft; pH 6.0
	0 to 4 inches; brown gravelly loamy sand; massive; soft; pH 6.0	0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6	
Subsoil	4 to 23 inches; pale brown gravelly loamy sand & loamy sand; massive; soft; pH 5.6 to 5.9	—	—
Substratum	23 to 60 inches; pale brown & pinkish gray very gravelly loamy sand & loamy sand; massive; soft; pH 5.1 to 5.9	7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9	7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand massive; soft; pH 6.0 to 7.0

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth	Deep (40 to 60 inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Moderate (5.5 inches)	Moderate (4.4 inches)	Low (3.4 inches)
Water Retention Class	2 (1.7 inches)	2 (1.4 inches)	2 (1.5 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.10	0.15	0.15
Soil Productivity	Low	Low	Low
Soil Manageability Group	II	II	II
Class	2p	2p	2p
Annual Forage Production	200 to 400 lb/acre	200 to 400 lb/acre	200 to 400 lb/acre
Forest Survey Site Class	5	5	5-7

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xerorthents, ashy, warm, on mountainsides & hillsides; Vitrandic Cryopsamments, on mountainsides, sand flats, depressions & opening in wooded areas; the Cozetica family, on mountainsides & hillsides; a soil similar to the Stecum family, but with a loamy-skeletal texture, on moraine sideslopes; the Fez family, 0 to 30 percent slopes, on mountainsides; Vitrandic Xerorthents, ashy, on hillsides, mountainsides & mountain benches; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

**124 - Vitrandic Xerorthents, pumiceous, warm - Vitrandic Haploxerolls, pumiceous - Vitrandic Xerorthents, ashy, warm complex, 0 to 15 percent**

Elevation: 7,700 to 8,100 feet      Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	<b>Vitrandic Xerorthents, pumiceous, warm</b>	<b>Vitrandic Haploxerolls, pumiceous</b>	<b>Vitrandic Xerorthents, ashy, warm</b>
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides & Rolling Hillsides	Rolling Hillsides & Undulating Mountain Flats	Mountainsides & Hillsides
Slope	0 to 15 percent	0 to 15 percent	0 to 15 percent
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Jeffrey Pine

**Soil Profile Description**

Surface Layer	4 to 0 inch; decomposed & decomposing Jeffrey Pine needles, twigs & cones	0 to 3 inches; grayish brown loamy sand; massive; soft; pH 5.5	1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts
Subsoil	—	—	—
Substratum	0 to 8 inches; grayish brown & light brownish gray very gravelly coarse sand; weak granular structure & massive; soft; pH 6.0 to 6.5	8 to 60 inches; light gray, very dark gray & white extremely gravelly & gravelly coarse sand; single grain & massive; loose & soft; pH 7.0	0 to 16 inches; grayish brown loamy coarse sand, gravelly loamy sand & gravelly loamy coarse sand; weak granular structure; soft; pH 5.1 to 5.6
		3 to 60 inches; brown & yellowish brown very gravelly & cobbly loamy sand; massive; soft; pH 6.0	16 to 60 inches; white & pale yellow very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.1 inches)	Moderate (4.3 inches)	Very Low (1.9 inches)
Water Retention Class	3 (0.6 inches)	2 (1.3 inches)	3 (1.0 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.10	0.15	0.15
Soil Productivity	Low	Low to Moderate	Low
Soil Manageability Group	III	II	III
Class	3P	2p	3P
Annual Forage Production (lb/acre)	200 to 400	300 to 600	200 to 400
Forest Survey Site Class	5	5	5

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Cryopsamments, in mountain basins & mountain flats; Vitrandic Cryorthents, pumiceous, on rolling hills & mountainsides; Vitrandic Haploxerolls, on rolling hills & mountainsides; Vitrandic Xeropsamments, warm, on rolling hills & mountainsides; and Vitrandic Xeropsamments, on mountainsides, at higher elevations. Included areas make up approximately 25 percent of the map unit area.

**126 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents - Vitrandic Xerorthents, pumiceous complex, 0 to 15 percent slopes**

Elevation: 8,000 to 8,400 feet      Annual Precipitation: 15 to 30 inches

Soil Map Unit Components	<b>Vitrandic Cryorthents, pumiceous</b>	<b>Vitrandic Cryorthents</b>	<b>Vitrandic Xerorthents, pumiceous</b>
Approx Proportion	25 percent	25 percent	15 percent
Landscape Position	Hillsides & Terraces	Hillsides, Terraces & Mountain Flats	Hillsides & Terraces
Slope	0 to 15 percent	0 to 15 percent	0 to 15 percent
Typical Vegetation	Lodgepole Pine	Lodgepole Pine	Jeffrey Pine

**Soil Profile Description**

Surface Layer	1/2 to 0 inch; decomposing & decomposed Lodgepole Pine needles, twigs & cones	1 to 0 inch; decomposed & decomposing Lodgepole Pine needles, twigs & cones	3 to 0 inch; decomposing Jeffrey & Lodgepole Pine needles, twigs & cones
Subsoil	—	—	—
Substratum	0 to 18 inches; light brownish gray & pale brown very gravelly sand; weak granular structure; soft; pH 5.0 to 5.5	0 to 2 inches; grayish brown very gravelly coarse sand; massive; soft; pH 5.5	0 to 10 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely massive; soft; pH 5.3
	18 to 60 inches; light gray, dark gray, light brownish gray & pale brown gravelly sand, fine sand & loamy fine sand; massive; soft; pH 6.0 to 6.5	2 to 60 inches; pale brown, light brownish gray, dark gray & pinkish gray very gravelly coarse sand; massive; soft; pH 5.5 to 6.5	10 to 60 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely gravelly coarse sand & loamy sand; weak platy structure &

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth	Very Deep (> 60 inches)	Mod. Deep (20 to 40 inches)	Mod. Deep (20 to 40 inches)
Available Water Capacity	Moderate (5.4 inches)	Very Low (1.6 inches)	Low (3.6 inches)
Water Retention Class	2 (1.2 inches)	3 (0.9 inches)	3 (1.1 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Very Rapid (20+ in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.10	0.10	0.15
Soil Productivity	Low	Very Low	Low
Soil Manageability Group	II	III	III
Class	2p	3Px	3Px
Annual Forage Production	200 to 400 lb/acre	< 200 lb/acre	200 to 400 lb/acre
Forest Survey Site Class	5-7	5-7	5-7

**Included Areas & Remarks**

Included in this map unit are small areas of a soil similar to Vitrandic Cryorthents, pumiceous, but the lower part of the soil is mixed mineralogy, on terraces; Vitrandic Xerorthents, warm, on mountain flats & fringes of mountain flats dominated by Jeffrey Pine; Vitrandic Xerorthents, ashy, 1 to 5 percent slopes, on mountain flats; Vitrandic Xeropsammets, 1 to 5 percent slopes, on mountain flats; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

**127 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents complex,  
15 to 30 percent slopes**

Elevation: 8,400 to 9,000 feet

Annual Precipitation: 15 to 30 inches

**Soil Map Unit Components**

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Cryorthents,  
pumiceous**

50 percent

Hillsides

15 to 30 percent

Lodgepole Pine

**Vitrandic Cryorthents**

25 percent

Hillsides

15 to 30 percent

Lodgepole Pine

**Soil Profile Description**

Surface Layer

1/2 to 0 inch; decomposing & decomposed  
Lodgepole Pine needles, twigs & cones

1 to 0 inch; decomposed & decomposing Lodgepole  
Pine needles, twigs & cones

0 to 18 inches; light brownish gray & pale brown  
very gravelly sand; weak granular structure; soft;  
pH 5.0 to 5.5

0 to 2 inches; grayish brown very gravelly coarse  
sand; massive; soft; pH 5.5

Subsoil

—

—

Substratum

18 to 60 inches; light gray, dark gray, light  
brownish gray & pale brown gravelly sand, fine  
sand & loamy fine sand; massive; soft; pH 6.0 to  
6.5

2 to 60 inches; pale brown, light brownish gray, dark  
gray & pinkish gray very gravelly coarse sand;  
massive; soft; pH 5.5 to 6.5

**Soil Properties**

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth  
(inches)

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Moderate (5.4 inches)

Very Low (1.6 inches)

Water Retention Class

2 (1.2 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Very Rapid (20+ in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Very Low

Soil Manageability

Group

II

III

Class

2ep

3Pex

Annual Forage Production  
(lb/acre)

200 to 400

< 200

Forest Survey Site Class

5-7

5-7

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xerorthents, pumiceous, on hillsides dominated by Jeffrey Pine; Vitrandic Xerorthents, pumiceous, cold, on hillsides with Jeffrey Pine & Lodgepole Pine vegetation; Vitrandic Cryopsamments, on hillsides; and Rock outcrop, on hillsides & ridges. Included areas make up approximately 25 percent of the map unit area.

**131 - Corbett family - Vitrandic Xeropsamments, warm - Rock outcrop complex,  
15 to 30 percent slopes**

Elevation: 7,200 to 8,600 feet      Annual Precipitation: 10 to 20 inches

**Soil Map Unit Components**

Approx Proportion

**Corbett family**

**Vitrandic  
Xeropsamments,  
warm**

**Rock outcrop,  
rhyolitic**

40 percent

20 percent

20 percent

Landscape Position

Mountainsides

Mountainsides

Mountainsides & Ridges

Slope

15 to 30 percent

15 to 30 percent

—

Typical Vegetation

Jeffrey Pine

Jeffrey Pine

Barren

**Soil Profile Description**

Surface Layer

0 to 3 inches; light brownish gray  
gravelly loamy sand; weak  
subangular blocky structure; soft;  
pH 6.0

0 to 1 inch; grayish brown loamy  
fine sand; massive; soft; pH 6.0

Rock outcrop consists of  
continuous bare bedrock & less  
than 15 percent inclusions of soil  
material capable of supporting  
plants.

Subsoil

—

—

—

Substratum

3 to 52 inches; light gray & white  
gravelly loamy sand & extremely  
gravelly loamy sand; massive; soft;  
pH 6.5

1 to 60 inches; light brownish  
gray & light gray very gravelly &  
gravelly coarse sand; massive;  
soft; pH 6.5

—

52 inches; soft rhyolitic tuff

**Soil Properties**

Restrictive Layer Depth

52 inches (FB)

Greater than 60 inches

Effective Rooting Depth  
(inches)

Deep (40 to 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.4 inches)

Low (3.7 inches)

Water Retention Class

3 (1.1 inches)

2 (1.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.17

0.20

Soil Productivity

Very Low

Very Low

Soil Manageability

Group

III

II

Class

3Pex

2epx

Annual Forage Production  
(lb/acre)

< 200

< 200

Forest Survey Site Class

5-6

6

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments, on mountainsides; and the Railcity family, on mountainsides, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

## 132 - Corbett - Railcity families - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,200 to 9,600 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components	Corbett family	Railcity family	Rock outcrop, rhyolitic
Approx Proportion	35 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Barren

### Soil Profile Description

Surface Layer	0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, and Big Sagebrush leaves  0 to 14 inches; grayish brown & light grayish brown gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0	—
	52 inches; soft rhyolitic tuff		

### Soil Properties

Restrictive Layer Depth	52 inches (FB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (2.4 inches)	Very Low (1.7 inches)	—
Water Retention Class	3 (1.1 inches)	3 (0.5 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Very Rapid (20+ in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.17	0.05	—
Soil Productivity	Very Low	Very Low	—
Soil Manageability			
Group	IV	IV	—
Class	4EPXg	4EPXg	—
Annual Forage Production (lb/acre)	< 200	< 200	—
Forest Survey Site Class	5-7	6-7	—

### Included Areas & Remarks

Included in this map unit are small areas of the Corbett, Railcity & Basket families, 15 to 30 percent slopes, on lower mountainsides; Vitrandic Xeropsammets, ashy, on mountainsides; a soil similar to the Corbett family, but with high amounts of rock fragments below 40 inches, 15 to 30 percent slopes, on lower mountainsides; and a soil similar to the Credo family, but with less than 18 percent clay in the textural control section. Included areas make up approximately 30 percent of the map unit area.

## 133 - Corbett family - Rock outcrop - Railcity family complex, 15 to 30 percent slopes

Elevation: 7,400 to 8,400 feet      Annual Precipitation: 10 to 20 inches

Soil Map Unit Components	<b>Corbett family</b>	<b>Rock outcrop, rhyolitic</b>	<b>Railcity family</b>
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides & Ridges	Mountainsides, near Rock outcroppings
Slope	15 to 30 percent	—	15 to 30 percent slopes
Typical Vegetation	Jeffrey Pine	Barren	Jeffrey Pine

### Soil Profile Description

Surface Layer	0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, and Big Sagebrush leaves  0 to 14 inches; grayish brown gravelly & extremely stony
Subsoil	—	—	—
Substratum	3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5  52 inches; soft rhyolitic tuff	—	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

### Soil Properties

Restrictive Layer Depth	52 inches (FB)	—	Greater than 60 inches
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	—	Very Deep (> 60 inches)
Available Water Capacity	Low (2.4 inches)	—	Very Low (1.7 inches)
Water Retention Class	3 (1.1 inches)	—	3 (0.5 inch)
Hydrologic Soil Group	A	—	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—	Very Rapid (20+ in./hr.)
Drainage Class	Somewhat Excessively	—	Somewhat Excessively
Max Erosion Hazard	Moderate	—	Low to Moderate
Erosion Factor (k)	0.17	—	0.05
Soil Productivity	Low	—	
Soil Manageability			
Group	IV	—	IV
Class	4PXe	—	4PXe
Annual Forage Production (lb/acre)	< 200	—	< 200
Forest Survey Site Class	5	—	6-7

### Included Areas & Remarks

Included in this map unit are small areas of the Corbett & Railcity families, 0 to 15 percent slopes, on gentle mountainsides; the Haypress family, on mountainsides; a soil similar to the Corbett family, but with higher amounts of rock fragments in the lower 30 inches of the profile, 0 to 15 percent slopes, on gentler mountainsides; a soil similar to Xeric Torriorthents, shallow, but with hard bedrock, the Stecum family, but with few approximately 25 percent of the

## 134 - Vitrandic Xeropsamments, warm, 0 to 15 percent slopes

Elevation: 6,500 to 8,100 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components	<b>Vitrandic Xeropsamments, warm</b>
Approx Proportion	80 percent
Landscape Position	Valley Bottoms, Mountain Stringer Valleys & Mountain Toeslopes
Slope	0 to 15 percent
Typical Vegetation	Big Sagebrush

### Soil Profile Description

Surface Layer	0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0
Subsoil	—
Substratum	1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.7 inches)
Water Retention Class	2 (1.3 inches)
Hydrologic Soil Group	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively
Max Erosion Hazard	Low
Erosion Factor (k)	0.20
Soil Productivity	Very Low
Soil Manageability Group	II
Annual Forage Production (lb/acre)	< 200
Forest Survey Site Class	6

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Xeropsamments, warm, but 40 to 60 inches to hard bedrock, on hillsides; the Lakash family, in drier valley bottoms; & Vitrandic Haploxerolls, on foothills. Included areas make up approximately 20 percent of the map unit area.

## 136 - Vitrandic Cryopsamments, 0 to 15 percent slopes

Elevation: 7,500 to 8,200 feet

Annual Precipitation: 10 to 15 inches

### Soil Map Unit Components

Approx Proportion

### Vitrandic Cryopsamments

90 percent

Landscape Position

Mountain Basins

Slope

0 to 15 percent

Typical Vegetation

Perennial Grass

### Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brown gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

Subsoil

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand, loamy coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.1 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.20

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

200 to 500

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryorthents. Included areas make up approximately 10 percent of the map unit area.

**137 - Vitrandic Xerorthents, pumiceous, warm - Vitrandic Xerorthents complex,  
0 to 30 percent slopes**

Elevation: 7,600 to 8,600 feet

Annual Precipitation: 10 to 20 inches

**Soil Map Unit Components**

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,  
pumiceous, warm**

40 percent

Mountainsides

0 to 30 percent

Jeffrey Pine

**Vitrandic Xerorthents**

25 percent

Mountainsides

0 to 30 percent

Jeffrey Pine

**Soil Profile Description**

Surface Layer

4 to 0 inch; decomposed & decomposing Jeffrey Pine needles, twigs & cones

1 to 0 inch; decomposing Red Fir & Jeffrey Pine needles, twigs & small branches

0 to 8 inches; grayish brown & light brownish gray very gravelly coarse sand; weak granular structure & massive; soft; pH 6.0 to 6.5

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

Subsoil

—

—

Substratum

8 to 60 inches; light gray, very dark gray & white extremely gravelly & gravelly coarse sand; single grain & massive; loose & soft; pH 7.0

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

**Soil Properties**

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.1 inches)

Very Low (0.8 inches)

Water Retention Class

3 (0.6 inches)

3 (0.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Very Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

200 to 400

< 200

Forest Survey Site Class

5-7

5-7

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Cryopsamments, 0 to 15 percent slopes, on mountain flats; Typic Xeropsamments, Typic Xeropsamments, warm, the Fez family, Vitrandic Haploxerolls, pumiceous, Vitrandic Xerorthents, pumiceous, & rhyolitic Rock outcrops. Included areas make up approximately 35 percent of the map unit area.

**138 - Vitrandic Xerorthents, pumiceous - Vitrandic Xeropsamments - Rock outcrop complex,  
30 to 60 percent slopes**

Elevation: 7,600 to 8,600 feet      Annual Precipitation: 10 to 25 inches

Soil Map Unit Components	<b>Vitrandic Xerorthents, pumiceous</b>	<b>Vitrandic Xeropsamments</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	35 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Mixed Conifer	Mixed Conifer	Barren

**Soil Profile Description**

Surface Layer	3 to 0 inch; decomposing Jeffrey Pine & Lodgepole Pine needles, twigs & cones  0 to 10 inches; grayish brown & light brownish gray loamy coarse sand & gravelly loamy sand; weak platy structure & massive; soft; pH 5.0	2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs  0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 4.9	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	10 to 60 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely gravelly coarse sand & loamy sand; weak platy structure, massive & single grain; soft; pH 5.3	7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9	—

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Mod. Deep (20 to 40 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (3.6 inches)	Moderate (4.4 inches)	—
Water Retention Class	3 (1.1 inches)	2 (1.4 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.15	0.15	—
Soil Productivity	Low	Low	—
Soil Manageability Group	IV	IV	—
Class	4EPXg	4EXpg	—
Annual Forage Production (lb/acre)	200 to 400	200 to 400	—
Forest Survey Site Class	5-7	4-5	—

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments, warm & Vitrandic Haploxerolls, 15 to 30 percent slopes, on gentler mountainsides & toeslopes; Vitrandic Xerorthents, pumiceous, warm; the Fez family; Vitrandic Cryopsamments; & a soil similar to Vitrandic Xeropsamments, warm, but with loamy texture in the lower half of the soil profile & on drier, 15 to 30 percent slopes. Included areas make up approximate 30 percent of the map unit area.

## 139 - Brantel family, 0 to 15 percent slopes

Elevation: 6,400 to 8,400 feet

Annual Precipitation: 6 to 15 inches

Soil Map Unit Components	<b>Brantel family</b>
Approx Proportion	70 percent
Landscape Position	Fans, Low Hills & Sand Flats
Slope	0 to 15 percent
Typical Vegetation	Bitterbrush

### Soil Profile Description

Surface Layer	0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0
Subsoil	—
Substratum	9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive, single grain & platy structure; soft; pH 5.5 to 7.2

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (2.4 inches)
Water Retention Class	3 (0.9 inches)
Hydrologic Soil Group	B
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively
Max Erosion Hazard	Low
Erosion Factor (k)	0.10
Soil Productivity	Low
Soil Manageability	
Annual Forage Production (lb/acre)	200 to 400
Forest Survey Site Class	NC

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Brantel family, but with stratified lacustrine deposits at a 30 to 40 inch depth, and calcareous; Vitrandic Haploxerolls, on bench terraces; a soil similar to Vitrandic Xerorthents, warm, but drier, on terraces; the Lakash family, on terraces; & the Deepwell family. Included areas make up approximately 30 percent of the map unit area.

## 140 - Cozetica family - Rock outcrop association, 15 to 60 percent slopes

Elevation: 7,200 to 9,200 feet

Annual Precipitation: 10 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Cozetica family

50 percent

Mountainsides & Moraines

15 to 60 percent

Big Sagebrush

### Rock outcrop

20 percent

Mountainsides, Sideslopes of Moraines & Ridges

—

Barren

### Soil Profile Description

Surface Layer

0 to 6 inches; grayish brown & light brownish gray  
gravelly sand; single grain; loose; pH 5.5 to 6.2

Rock outcrop consists of continuous bare bedrock &  
less than 15 percent inclusions of soil material capabl  
of supporting plants.

Subsoil

—

—

Substratum

6 to 60 inches; light gray & very pale brown loamy  
sand & gravelly coarse sand; single grain; loose;  
pH 5.4 to 6.1

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth  
(inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (4.1 inches)

—

Water Retention Class

2 (1.6 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.08

—

Soil Productivity

Low

—

Soil Manageability

Annual Forage Production  
(lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

### Included Areas & Remarks

Included in this map unit are small areas of the Cozetica family, 0 to 15 percent slopes; a soil similar to the Cozetica family, but shallow to hard bedrock, on mountainsides & moraines, near rock outcroppings; a soil similar to the Berent family, but colder, on mountainsides; and Aquic Haploxerolls, 0 to 15 percent slopes, in concave areas & basins. Included areas make up approximately 30 percent of the map unit area.

## 142 - Brantel family - Rock outcrop complex, 0 to 30 percent slopes

Elevation: 7,000 to 7,600 feet

Annual Precipitation: 8 to 12 inches

### Soil Map Unit Components

Approx Proportion

50 percent

### Rock outcrop, tuffaceous & granitic

20 percent

Landscape Position

Hillsides, Hilltops & Depressions

Hillsides & Hilltops

Slope

0 to 30 percent

—

Typical Vegetation

Bitterbrush

Barren

### Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive, single grain & platy structure; soft; pH 5.5 to 7.2

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Low (2.4 inches)

—

Water Retention Class

3 (0.9 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Brantel family, but shallow to fractured tuff, on hillsides; a soil similar to the Berent family, but shallow to hard bedrock, near rock outcroppings; & a soil similar to the Berent family, but with ash parent material in the upper half of the soil profile, near rock outcroppings. Included areas make up approximately 30 percent of the map unit area.

**143 - Vitrandic Xerorthents, pumiceous - Vitrandic Xeropsamments complex,  
0 to 15 percent slopes**

Elevation: 7,500 to 8,600 feet

Annual Precipitation: 10 to 20 inches

**Soil Map Unit Components**

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,  
pumiceous**

60 percent

Mountain Basins

0 to 15 percent

Perennial Grass

**Vitrandic Xeropsamments**

25 percent

Mountain Basins

0 to 15 percent

Perennial Grass

**Soil Profile Description**

Surface Layer

3 to 0 inch; decomposing Jeffrey & Lodgepole Pine needles, twigs & cones

2 to 0 inch; decomposing Red Fir & Jeffrey Pine needles & twigs

0 to 10 inches; grayish brown & light brownish gray loamy coarse sand & gravelly loamy sand; weak platy structure & massive; soft; pH 5.0

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

10 to 60 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely gravelly coarse sand & loamy sand; weak platy structure, single grain & massive; soft; pH 5.3

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

**Soil Properties**

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.6 inches)

Moderate (4.4 inches)

Water Retention Class

3 (1.1 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

II

Class

3P

2p

Annual Forage Production (lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

5-7

4-5

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xerorthents & Vitrandic Xerorthents, ashy, on fringes of mountain basins. Included areas make up approximately 15 percent of the map unit area.

## 144 - Cozetica family, 0 to 30 percent slopes

Elevation: 7,500 to 8,000 feet

Annual Precipitation: 10 to 15 inches

### Soil Map Unit Components

Approx Proportion

### Cozetica family

75 percent

Landscape Position

Mountain Toeslopes, Mountain Flats & Basins

Slope

0 to 30 percent

Typical Vegetation

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 6 inches; grayish brown & light brownish gray  
gravelly sand; single grain; loose; pH 5.5 to 6.2

Subsoil

—

Substratum

6 to 60 inches; light gray & very pale brown loamy  
sand & gravelly coarse sand; single grain; loose;  
pH 5.4 to 6.1

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth  
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.1 inches)

Water Retention Class

2 (1.6 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.08

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production  
(lb/acre)

200 to 400

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Lakash family, on edges of mountain flats & on lower mountainsides; Vitrandic Xerorthents, ashy, warm, on mountain toeslopes, flats & basins; Vitrandic Xeropsamments, warm, on mountain toeslopes, flats & basins; and Vitrandic Xerorthents, on mountain toeslopes, flats & basins. Included areas make up approximately 25 percent of the map unit area.

**145 - Vitrandic Xeropsamments, warm - Vitrandic Xerorthents, ashy, warm - Vitrandic Cryorthents, ashy complex, 0 to 30 percent slopes**

Elevation: 7,500 to 8,000 feet      Annual Precipitation: 10 to 20 inches

Soil Map Unit Components	<b>Vitrandic Xeropsamments, warm</b>	<b>Vitrandic Xerorthents, ashy, warm</b>	<b>Vitrandic Cryorthents, ashy</b>
Approx Proportion	40 percent	30 percent	15 percent
Landscape Position	Mountainsides & Hillsides	Mountainsides & Hillsides	Mountain Flats & Open Areas
Slope	0 to 30 percent	0 to 30 percent	0 to 15 percent
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Jeffrey Pine/Lodgepole Pine

**Soil Profile Description**

Surface Layer	0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0	1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts	0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0
Subsoil	—	0 to 16 inches; grayish brown loamy coarse sand & gravelly loamy sand; weak granular structure; soft; pH 5.1 to 5.6	—
Substratum	1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5	16 to 60 inches; white & pale brown very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7	7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand massive; soft; pH 6.0 to 7.0

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.7 inches)	Very Low (1.9 inches)	Low (3.4 inches)
Water Retention Class	2 (1.3 inches)	3 (1.0 inches)	2 (1.5 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low to Moderate	Low to Moderate	Low
Erosion Factor (k)	0.20	0.15	0.15
Soil Productivity	Very Low	Low	Low
Soil Manageability Group	II	III	II
Class	2epx	3Pex	2px
Annual Forage Production (lb/acre)	< 200	200 to 400	200 to 400
Forest Survey Site Class	5-6	5-6	5-7

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments, 0 to 30 percent slopes, in mountain basins & flats; and Rock outcrop. Included areas make up approximately 15 percent of the map unit area.

## 146 - Lakash - Brantel families complex, 0 to 15 percent slopes

Elevation: 6,500 to 7,300 feet

Annual Precipitation: 6 to 12 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Lakash family

40 percent

Hillsides & Terraces

0 to 15 percent

Big Sagebrush

### Brantel family

30 percent

Hillsides & Terraces

0 to 15 percent

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 5 inches; light brownish gray & pale brown gravelly coarse sand; massive & single grain; loose & soft; pH 5.3

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

5 to 60 inches; light gray & white gravelly loamy sand & coarse sand; massive; soft; pH 5.7 to 8.7

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; single grain & platy structure; soft; pH 5.5 to 7.2

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Low (2.6 inches)

Low (2.4 inches)

Water Retention Class

3 (0.8 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Lakash family, but with pumice parent material; a soil similar to the Lakash family, but with pumice over ashy texture; Aquandic Endoaquolls, on terraces adjacent to creeks & in meadows; & Rock outcrop, rhyolitic, on hillsides & hilltops. Included areas make up approximately 30 percent of the map unit area.

## 148 - Stecum - Salt Chuck families complex, 30 to 75 percent slopes

Elevation: 7,400 to 9,200 feet

Annual Precipitation: 12 to 20 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Stecum family

50 percent

Moraines

30 to 75 percent

Lodgepole Pine

### Salt Chuck family

20 percent

Moraines

30 to 75 percent

Lodgepole Pine

### Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

0 to 14 inches; dark grayish brown & brown extremely stony loamy sand; single grain; loose; pH 5.9

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

—

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

14 to 33 inches; light yellowish brown & light gray very gravelly & extremely stony loamy sand; massive; slightly hard; pH 6.1

33 inches; soft decomposing granitic bedrock

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

33 inches (FB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Very Low (2.0 inches)

Very Low (0.5 inches)

Water Retention Class

3 (0.8 inches)

3 (0.5 inches)

Hydrologic Soil Group

A

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to Very High

Moderate to Very High

Erosion Factor (k)

0.10

0.05

Soil Productivity

Low

Low

Soil Manageability

Group

IV

IV

Class

4EPg

4EPg

Annual Forage Production (lb/acre)

< 300

200 to 400

Forest Survey Site Class

6-7

6-7

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Cryorthents, but with sandy-skeletal textures at depths greater than 25 inches; a soil similar to the Stecum family, but buried under 20 inches of pumice; Lithic Cryorthents, Vitrandic Cryopsamments, Nanamkin family & Rock outcrop. Included areas make up approximately 30 percent of the map unit area.

## 149 - Nanamkin family - Vitrandic Haploxerolls complex, 15 to 30 percent slopes

Elevation: 7,200 to 7,800 feet

Annual Precipitation: 10 to 15 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Nanamkin family

50 percent

Mountain Toeslopes

15 to 30 percent

Lodgepole Pine

### Vitrandic Haploxerolls, warm

30 percent

Mountain Toeslopes

15 to 30 percent

Jeffrey Pine

### Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

10 to 60 inches; light brownish, pinkish gray & pale brown gravelly coarse sand, loamy coarse sand & loamy sand; massive; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Low (3.4 inches)

Water Retention Class

3 (0.8 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low

Erosion Factor (k)

0.05

0.10

Soil Productivity

Low

Low to Moderate

Soil Manageability

Group

III

III

Class

3Pe

3P

Annual Forage Production (lb/acre)

200 to 400

300 to 500

Forest Survey Site Class

6-7

5

### Included Areas & Remarks

Included in this map unit are small areas of the Railcity & Lakash families. Included areas make up approximately 20 percent of the map unit area.

**150 - Vitrandic Cryopsamments - Vitrandic Cryorthents, ashy complex,  
9 to 30 percent slopes**

Elevation: 8,400 to 9,100 feet      Annual Precipitation: 15 to 35 inches

**Soil Map Unit Components**

Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

**Vitrandic Cryopsamments**

40 percent  
Hillsides & Mountainsides  
9 to 30 percent  
Lodgepole Pine

**Vitrandic Cryorthents, ashy**

35 percent  
Mountainsides  
9 to 30 percent  
Lodgepole Pine

**Soil Profile Description**

**Surface Layer**

0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0

**Subsoil**

—

—

**Substratum**

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand; massive; soft; pH 6.0 to 7.0

**Soil Properties**

**Restrictive Layer Depth**

Greater than 60 inches

Greater than 60 inches

**Effective Rooting Depth (inches)**

Very Deep (> 60 inches)

Very Deep (> 60 inches)

**Available Water Capacity**

Low (3.1 inches)

Low (3.4 inches)

**Water Retention Class**

3 (1.2 inches)

2 (1.5 inches)

**Hydrologic Soil Group**

A

A

**Permeability (in./hr.)**

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

**Drainage Class**

Somewhat Excessively

Somewhat Excessively

**Max Erosion Hazard**

Low to Moderate

Low to Moderate

**Erosion Factor (k)**

0.20

0.15

**Soil Productivity**

Low to Moderate

Low

**Soil Manageability**

**Group**

III

II

**Class**

3Pe

2ep

**Annual Forage Production (lb/acre)**

200 to 500

200 to 400

**Forest Survey Site Class**

6-NC

5-7

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Xeropsamments, 30 to 60 percent slopes; Vitrandic Cryorthents, Vitrandic Xerorthents, ashy & Rock outcrop. Included areas make up approximately 25 percent of the map unit area.

## 151 - Vitrandic Xeropsamments, warm - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,000 to 9,500 feet

Annual Precipitation: 10 to 20 inches

### Soil Map Unit Components

Approx Proportion

**Vitrandic Xeropsamments, warm**

**Rock outcrop**

Landscape Position

50 percent

15 percent

Slope

Mountainsides

Mountainsides & Ridges

Typical Vegetation

15 to 60 percent

—

Jeffrey Pine

Barren

### Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.7 inches)

—

Water Retention Class

2 (1.3 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.20

—

Soil Productivity

Very Low

—

Soil Manageability

Group

IV

—

Class

4EXgp

—

Annual Forage Production (lb/acre)

< 200

—

Forest Survey Site Class

5-7

—

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, warm, 0 to 15 percent slopes in valley bottoms & gentler mountainsides; Vitrandic Haploxerolls; Vitrandic Xerorthents; a soil similar to Vitrandic Xeropsamments, warm, but shallow to soft pumiceous tuff bedrock; a soil similar to Vitrandic Xeropsamments, warm, but shallow to hard bedrock, near rock outcroppings; and the Corbett family, 0 to 15 percent slopes, on mountain benches. Included areas make up approximately 35 percent of the map unit area.

## 152 - Vitrandic Cryopsamments - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 8,800 to 9,700 feet

Annual Precipitation: 20 to 35 inches

### Soil Map Unit Components

Approx Proportion

**Vitrandic Cryopsamments**

**Rock outcrop, granitic**

50 percent

20 percent

Landscape Position

Mountainsides

Mountainsides & Ridges

Slope

15 to 30 percent

—

Typical Vegetation

Lodgepole Pine

Barren

### Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.1 inches)

—

Water Retention Class

3 (1.2 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.20

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

200 to 500

—

Forest Survey Site Class

7-NC

—

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, 30 to 60 percent slopes, on steeper mountainsides; the Stecum family; a soil similar to Vitrandic Cryopsamments, but underlain by glacial till at depths of greater than 40 inches; Vitrandic Cryorthents, ashy; and Vitrandic Cryorthents, pumiceous. Included areas make up approximately 30 percent of the map unit area.

## 153 - Vitrandic Cryopsamments - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 9,100 to 10,200 feet      Annual Precipitation: 20 to 40 inches

Soil Map Unit Components	<b>Vitrandic Cryopsamments</b>	<b>Rock outcrop, granitic</b>
Approx. Proportion	50 percent	20 percent
Landscape Position	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	—
Typical Vegetation	Lodgepole Pine	Barren

### Soil Profile Description

Surface Layer	0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—
Substratum	11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (3.1 inches)	—
Water Retention Class	3 (1.2 inches)	—
Hydrologic Soil Group	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	—
Erosion Factor (k)	0.20	—
Soil Productivity	Low to Moderate	—
Soil Manageability Group	IV	—
Class	4EPXg	—
Annual Forage Production (lb/acre)	200 to 500	—
Forest Survey Site Class	7-NC	—

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryorthents; a soil similar to Vitrandic Cryopsamments, but underlain by to Vitrandic Cryopsamments, but Cryorthents, ashy. Included areas make up approximately 30 percent of the map unit area.

**154 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents - Rock outcrop complex,  
30 to 60 percent slopes**

Elevation: 8,200 to 9,900 feet      Annual Precipitation: 12 to 45 inches

Soil Map Unit Components	<b>Vitrandic Cryorthents, pumiceous</b>	<b>Vitrandic Cryorthents</b>	<b>Rock outcrop, granitic</b>
Approx Proportion	35 percent	25 percent	20 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Lodgepole Pine	Lodgepole Pine	Barren

**Soil Profile Description**

Surface Layer	1/2 to 0 inch; decomposing & decomposed Lodgepole Pine needles, twigs & cones	1 to 0 inch; decomposed & decomposing Lodgepole Pine needles, twigs & cones	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	0 to 18 inches; light brownish gray & pale brown very gravelly sand; weak granular structure; soft; pH 5.0 to 5.5	0 to 2 inches; grayish brown very gravelly coarse sand; massive; soft; pH 5.5	—
	18 to 60 inches; light gray, dark gray, light brownish gray & pale brown gravelly sand, fine sand & loamy fine sand; massive; soft; pH 6.0 to 6.5	2 to 60 inches; pale brown, light brownish gray, dark gray & pinkish gray very gravelly coarse sand; massive; soft; pH 5.5 to 6.5	—

**Soil Properties**

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Mod. Deep (20 to 40 inches)	—
Available Water Capacity	Moderate (5.4 inches)	Very Low (1.6 inches)	—
Water Retention Class	2 (1.2 inches)	3 (0.9 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Very Rapid (20+ in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.10	0.10	—
Soil Productivity	Low	Very Low	—
Soil Manageability Group	IV	IV	—
Soil Manageability Class	4EXgp	4EPXg	—
Annual Forage Production (lb/acre)	200 to 400	< 200	—
Forest Survey Site Class	5-7	5-7	—

**Included Areas & Remarks**

Included in this map unit are small areas of Vitrandic Cryorthents, pumiceous, 60 to 80 percent slopes, on steeper mountainsides; Vitrandic Cryorthents, 60 to 80 percent slopes, on steeper mountainsides; Vitrandic Cryorthents, ashy; & Vitrandic Cryopsammments. Included areas make up approximately 20 percent of the map unit area.

## 155 - Aquandic Endoaquolls, 0 to 5 percent slopes

Elevation: 7,800 to 8,100 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Aquandic Endoaquolls

75 percent

Concave Sand Flats

0 to 5 percent

Sedge - Rush & Big Sagebrush

### Soil Profile Description

Surface Layer

3 to 0 inches; gass litter & a thick matting of grass roots.

0 to 28 inches; gray gravelly loamy sand; massive; slightly hard; pH 6.5.

Subsoil

—

Substratum

28 to 60 inches; brown gravelly loamy coarse sand; single grain; loose; pH 6.7

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.7 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Poorly

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.10

Soil Productivity

Low to High

Soil Manageability

Group

IV

Class

4PW

Annual Forage Production (lb/acre)

200 to 1,500

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Fez family, 5 to 30 percent slopes, on adjacent mountainsides; the Brantel & Lakash families in higher convex areas of sand flats. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a high erosion hazard rating. Included areas make up approximately 25 percent of the map unit area.

## 156 - Charcol - Cowood families complex, 2 to 30 percent slopes

Elevation: 7,400 to 10,000 feet

Annual Precipitation: 10 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Charcol family

50 percent

Mountainsides & Mountain Benches

2 to 30 percent

Whitebark Pine

### Cowood family

20 percent

Mountain Benches, near Rock Outcroppings

2 to 30 percent

Big Sagebrush

### Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Big Sagebrush plant parts

0 to 5 inches; dark grayish brown extremely stony loamy coarse sand & sandy loam; single grain & weak subangular blocky structure; loose & soft; pH 6.4

Subsoil

0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0

23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5

5 to 11 inches; yellowish brown extremely stony sandy loam; moderate subangular blocky structure; soft; pH 6.3

Substratum

—

11 inches; hard adamellite bedrock

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

11 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Moderate (4.7 inches)

Very Low (0.3 inches)

Water Retention Class

2 (1.8 inches)

3 (0.3 inches)

Hydrologic Soil Group

B

C-D

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.24

0.05

Soil Productivity

Moderate

Low

Soil Manageability

Group

II

IV

Class

2epx

4PXed

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Charcol family, but shallow to fractured bedrock, on mountainsides; Lithic Cryorthents, on mountainsides; & Rock outcrop, on mountainsides & ridges. Included areas make up approximately 30 percent of the map unit area.

## 157 - Stecum - Guiser families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,600 to 11,200 feet      Annual Precipitation: 12 to 30 inches

Soil Map Unit Components	<b>Stecum family</b>	<b>Guiser family</b>	<b>Rock outcrop, granitic</b>
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides & Benches	Mountainsides & Benches	Mountainsides, Ridges, Bluffs & Edges of Plateaus
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Whitebark Pine	Whitebark Pine	Barren

### Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	2 to 0 inch; decomposing Lodgepole & Whitebark Pine twigs, needles & cones  0 to 9 inches; brown gravelly loamy sand; massive; soft; pH 6.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	9 to 47 inches; yellowish brown & reddish yellow very gravelly sandy loam; massive; soft; pH 5.5 to 6.0	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; pH 5.5	47 to 60 inches; yellowish brown very gravelly sandy loam; massive; soft; pH 5.5	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Low (3.8 inches)	—
Water Retention Class	3 (0.8 inches)	3 (1.0 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.10	0.15	—
Soil Productivity	Low	Moderate	—
Soil Manageability			
Group	IV	IV	—
Class	4EPgx	4EPgx	—
Annual Forage Production (lb/acre)	< 300	200 to 400	—
Forest Survey Site Class	NC	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of Lithic Cryorthents, ridges & adjacent to rock outcroppings; the Charcol family, 15 to 30 percent slopes, in riparian areas; the Cowood family, near rock outcroppings; & Aquic Cryoborolls, 15 to 30 percent slopes, in riparian areas. Included areas make up approximately 25 percent of the map unit area.

## 158 - Stecum - Charcol families - Rock outcrop complex, 30 to 70 percent slopes

Elevation: 6,800 to 10,000 feet      Annual Precipitation: 8 to 25 inches

Soil Map Unit Components	Stecum family	Charcol family	Rock outcrop, granitic
Approx Proportion	35 percent	25 percent	15 percent
Landscape Position	Moraines & Mountainsides	Moraines & Mountainsides	Mountainsides & Ridges
Slope	30 to 70 percent	30 to 70 percent	—
Typical Vegetation	Lodgepole Pine	Whitebark Pine	Barren

### Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	1 to 0 inch; decomposing Big Sagebrush plant parts  0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Moderate (4.7 inches)	—
Water Retention Class	3 (0.8 inches)	2 (1.8 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Moderate to Very High	Moderate to Very High	—
Erosion Factor (k)	0.10	0.24	—
Soil Productivity	Low	Moderate	—
Soil Manageability Group	IV	III	—
Class	4EPgx	3Egpx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of the Nanmakin family, on mountainsides & moraines, at lower elevations; Lithic Cryorthents, near rock outcroppings; Aquic Cryoborolls, 15 to 30 percent slopes, in riparian areas; the Charcol family, 15 to 30 percent slopes, on moraine toeslopes; a soil similar to the Charcol family, but with a thinner dark surface layer, on mountainsides; a soil similar to the Charcol family, but with sandy-skeletal textures, 15 to 30 percent slopes, on mountain toeslopes. Included areas make up approximately 25 percent of the map unit area.

## 159 - Aquic Cryoborolls, 5 to 30 percent slopes

Elevation: 7,300 to 10,600 feet      Annual Precipitation: 10 to 25 inches

Soil Map Unit Components	<b>Aquic Cryoborolls</b>
Approx Proportion	80 percent
Landscape Position	Mountain Basins
Slope	5 to 30 percent
Typical Vegetation	Sedges, Grasses and Willows

### Soil Profile Description

Surface Layer	0 to 21 inches; brown & grayish brown sand & loamy sand; single grain; soft; pH 6.5
Subsoil	—
Substratum	21 to 43+ inches; brown & varigated dark gray & pale brown loamy sand, gravelly sand & gravelly coarse sand; single grain; soft; pH 5.5 to 6.0

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (2.7 inches)
Water Retention Class	2 (1.4 inches)
Hydrologic Soil Group	C-D
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	Poorly
Max Erosion Hazard	Low to High
Erosion Factor (k)	0.17
Soil Productivity	Low to High
Soil Manageability Group	III
Class	3EWps
Annual Forage Production (lb/acre)	200 to 1,500
Forest Survey Site Class	NC

### Included Areas & Remarks

Included in this map unit are small areas of the Stecum & Haypress families, on mountainsides. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a higher erosion hazard rating. Included areas make up approximately 20 percent of the map unit area.

## 160 - Haypress family, 30 to 60 percent slopes

Elevation: 7,800 to 9,600 feet

Annual Precipitation: 15 to 25 inches

### Soil Map Unit Components

Approx Proportion

### Haypress family

75 percent

Landscape Position

Mountainsides & Glacial Debris

Slope

30 to 60 percent

Typical Vegetation

Quaking Aspen

### Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Aspen plant parts

0 to 22 inches; grayish brown & pale brown loamy sand; massive; soft; pH 7.0

Subsoil

—

Substratum

22 to 60 inches; brown, yellowish brown & strong brown very bouldery loamy sand & gravelly loamy sand; massive; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.8 inches)

Water Retention Class

2 (1.8 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.20

Soil Productivity

Moderate

Soil Manageability

Group

III

Class

3Egp

Annual Forage Production (lb/acre)

800 to 1500

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Corbett, Chesaw & Nanamkin families, on mountainsides. Included areas make up approximately 25 percent of the map unit area.

## 161 - Torriorthentic Haploxerolls, 2 to 30 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Torriorthentic Haploxerolls

65 percent

Terraces & Moraines

2 to 30 percent

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Water Retention Class

2 (1.8 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.22

Soil Productivity

Moderate

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

400 to 800

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Torriorthentic Haploxerolls, but with sandy-skeletal textures, on terraces; the Kiona family, on terraces; the Brantel family, on stream terraces, adjacent to the edges of the unit; Yellowhills family, on terraces; Vitrandic Xerofluvents, on stream terraces adjacent to edges of the unit; a soil similar to the Abgese family, but with rock fragments in the profile, on terraces & moraines; & Rock outcrop, on terraces & moraines. Included areas make up approximately 35 percent of the map unit area.

## 162 - Torriorthentic Haploxerolls - Rock outcrop complex, 2 to 15 percent slopes

Elevation: 6,900 to 7,100 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components	Torriorthentic Haploxerolls	Rock outcrop
Approx Proportion	40 percent	30 percent
Landscape Position	Hillsides & Hilltops	Hilltops & Hillsides
Slope	2 to 15 percent	—
Typical Vegetation	Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0	—
Substratum	20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; ph 7.0	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Moderate (5.4 inches)	—
Water Retention Class	2 (1.8 inches)	—
Hydrologic Soil Group	B	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Low	—
Erosion Factor (K)	0.22	—
Soil Productivity	Moderate	—
Soil Manageability Group	II	—
Class	2p	—
Annual Forage Production (lb/acre)	400 to 800	—
Forest Survey Site Class	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Torriorthentic Haploxerolls, but with sandy-skeletal textures; the Jaybee, Wrango, Fez & Buscones families. Included areas make up approximately 30 percent of the map unit area.

## 163 - Yellowhills - Brantel families complex, 2 to 5 percent slopes

Elevation: 7,000 to 7,400 feet

Annual Precipitation: 10 to 12 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Yellowhills family

70 percent

Valleys

2 to 5 percent

Bitterbrush

### Brantel family

15 percent

Valleys

2 to 5 percent

Bitterbrush

### Soil Profile Description

Surface Layer

0 to 5 inches; grayish brown gravelly coarse sand & sand; single grain & massive; loose & soft; pH 6.0

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

5 to 60 inches; brown & yellowish brown loamy sand; massive; soft; pH 6.5 to 7.0

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; single grain & platy structure; soft; pH 5.5 to 7.2

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Low (2.4 inches)

Water Retention Class

2 (1.6 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

III

Class

2p

3P

Annual Forage Production (lb/acre)

300 to 600

200 to 400

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of Torriorthentic Haploxerolls, on valley edges; the Cozetica family; & Vitrandic Xeropsamments. Included areas make up approximately 15 percent of the map unit area.

## 164 - Vitrandic Xerochrepts - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,500 to 8,000 feet

Annual Precipitation: 12 to 30 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Vitrandic Xerochrepts

50 percent

Mountainsides & Moraines

30 to 60 percent

Red Fir

### Rock outcrop, rhyolitic

20 percent

Mountainsides & Moraines

—

Barren

### Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown gravelly coarse sand; single grain; loose; pH 6.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

1 to 60 inches; white, yellow, light gray, pale brown & brown gravel, gravelly & extremely cobbly loamy sand; extremely cobbly sandy loam & silt loam; massive & single grain; soft & loose; pH 6.0 to 7.0

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (2.9 inches)

—

Water Retention Class

3 (0.5 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr)

—

Drainage Class

Well

—

Max Erosion Hazard

Moderate to high

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

< 200

—

Forest Survey Site Class

5-7

—

### Included Areas & Remarks

Included in this map unit are small areas of the Stecum family, at higher elevations; Vitrandic Xerorthents, Vitrandic Xerorthents, pumiceous & Vitrandic Xerorthents, ashy. Included areas make up approximately 30 percent of the map unit area.

## 169 - Vitrandic Xerofluvents, 0 to 15 percent slopes

Elevation: 6,800 to 7,000 feet

Annual Precipitation: 8 to 12 inches

### Soil Map Unit Components

Approx Proportion

### Vitrandic Xerofluvents

85 percent

Landscape Position

Mountain Basins

Slope

0 to 15 percent

Typical Vegetation

Big Sagebrush

### Soil Profile Description

Surface Layer

1 to 0 inch; decomposed & decomposing Big Sagebrush twigs & leaves

0 to 12 inches; dark gray sandy loam; single grain, massive; soft; pH 6.5 to 7.0

Subsoil

—

Substratum

12 to 60 inches; gray sandy loam, loamy sand & coarse sand; massive; soft; pH 7.5 to 8.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A-B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.20

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

200 to 500

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Yellowhills family, in higher areas, on fringes of basins; the Brantel family, in higher areas, on fringes of basins; & a soil similar to the yellowhills family, but with granitic parent material, on fringes of basins. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a high erosion hazard rating. Included areas make up approximately 15 percent of the map unit area.

## 170 - Springmeyer family, 30 to 60 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Springmeyer family

85 percent

Mountainsides

30 to 60 percent

Bitterbrush

### Soil Profile Description

Surface Layer

0 to 13 inches; grayish brown & brown gravelly sand; massive and single grain; soft & loose; pH 7.0 to 7.5

Subsoil

13 to 32 inches; brown, olive brown & light brownish gray sandy loam & clay loam; massive; soft & slightly hard; pH 7.5

Substratum

32 to 60 inches; soft fractured paralithic tuff

### Soil Properties

Restrictive Layer Depth

32 to 60 inches (PC)

Effective Rooting Depth (inches)

Mod. Deep to Deep (20 to 60 in)

Available Water Capacity

Low (3.2 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr)

Drainage Class

Well

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.15

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3Egp

Annual Forage Production (lb/acre)

200 to 800

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Abgese & Calpine families. Included areas make up approximately 15 percent of the map unit area.

## 171 - Sumine family - Rock outcrop complex, 2 to 30 percent slopes

Elevation: 7,600 to 9,400 feet

Annual Precipitation: 12 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Sumine family

60 percent

Mountainsides & Benches

2 to 30 percent

Bitterbrush

### Rock outcrop, basalt

20 percent

Mountain Ridges & Mountainsides

—

Barren

### Soil Profile Description

Surface Layer

1/4 to 0 inch; fresh & decomposing shrub parts

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 27 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.2

Subsoil

27 to 60 inches; pale brown very gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.5

—

Substratum

—

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 Inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.8 inches)

—

Water Retention Class

2 (2.0 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

II

—

Class

2ep

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

7-NC

—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Sur family, but cooler, on mountainsides; & the Bearskin family, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

## 172 - Calpine - Mottsville families association, 2 to 30 percent slopes

Elevation: 6,800 to 7,000 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components  
 Approx Proportion  
 Landscape Position  
 Slope  
 Typical Vegetation

### Calpine family

50 percent  
 Undulating Terrace Tops  
 2 to 15 percent slopes  
 Big Sagebrush

### Mottsville family

35 percent  
 Terrace Sideslopes  
 15 to 30 percent slopes  
 Big Sagebrush

### Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

1/4 to 0 inch; decomposing Sagebrush leaves & twigs

0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8

0 to 19 inches; grayish brown gravelly sandy loam & loamy coarse sand; weak granular structure; soft; pH 6.0 to 6.5

Subsoil

15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5

19 to 25 inches; grayish brown gravelly coarse sand; weak subangular blocky structure; soft; pH 6.8

Substratum

39 to 60 inches; pale brown very gravelly sand loam; massive; hard; pH 6.5

25 to 60 inches; grayish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Low (3.2 inches)

Water Retention Class

2 (1.9 inches)

3 (1.2 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low to Moderate

Erosion Factor (k)

0.25

0.25

Soil Productivity

Low to Moderate

Low to Moderate

Soil Manageability

Group

II

III

Class

2p

3Pe

Annual Forage Production (lb/acre)

300 to 600

200 to 500

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Berent family, 2 to 15 percent slopes, on undulating terraces; & the Preston family, 15 to 30 percent slopes, on terrace sideslopes. Included areas make up approximately 15 percent of the map unit area.

## 173 - Fez family - Vitrandic Xeropsamments complex, 30 to 60 percent slopes

Elevation: 8,000 to 9,300 feet

Annual Precipitation: 15 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Fez family

60 percent

Hillsides

30 to 60 percent

Quaking Aspen

### Vitrandic Xeropsamments

25 percent

Hillsides

30 to 60 percent

Lodgepole Pine

### Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Aspen leaves & twigs

2 to 0 inch; decomposing Red Fir & Jeffrey Pine needles & twigs

0 to 10 inches; grayish brown & brown sand; massive; soft; pH 6.0

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

10 to 60 inches; brown & light yellowish brown sand; massive; soft; pH 6.0

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Moderate (4.4 inches)

Water Retention Class

2 (1.9 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.14

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

II

Class

3Egp

3Egp

Annual Forage Production (lb/acre)

400 to 800

200 to 400

Forest Survey Site Class

NC

4-6

### Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on hillsides & ridges; & Vitrandic Xerorthents, ashy. Included areas make up approximately 15 percent of the map unit area.

## 174 - Torriorthentic Haploxerolls - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,400 feet

Annual Precipitation: 10 to 15 inches

### Soil Map Unit Components

Approx Proportion

Torriorthentic Haploxerolls  
60 percent

**Rock outcrop, metasedimentary & granitic**

20 percent

Landscape Position

Mountainsides & Moraines

Mountainsides & Ridges

Slope

30 to 60 percent

—

Typical Vegetation

Big Sagebrush

Barren

### Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

—

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (5.4 inches)

—

Water Retention Class

2 (1.8 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.22

—

Soil Productivity

Moderate

—

Soil Manageability

Group

III

—

Class

4EXgp

—

Annual Forage Production (lb/acre)

400 to 800

—

Forest Survey Site Class

NC

—

### Included Areas & Remarks

Included in this map unit are small areas of Torriorthentic Haploxerolls, 2 to 15 percent slopes, on gentle mountainsides & moraines; & a soil similar to Torriorthentic Haploxerolls, but with a sandy-skeletal texture, on mountainsides & moraines. Included areas make up approximately 20 percent of the map unit area.

## 175 - Calpine family, 5 to 30 percent slopes

Elevation: 6,900 to 7,600 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components	<b>Calpine family</b>
Approx Proportion	70 percent
Landscape Position	Valley Fill Areas
Slope	5 to 30 percent
Typical Vegetation	Big Sagebrush

### Soil Profile Description

Surface Layer	1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs
	0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8
Subsoil	15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5
Substratum	39 to 60 inches; pale brown very gravelly sandy loam; massive; hard; pH 6.5

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Moderate (5.1 inches)
Water Retention Class	2 (1.9 inches)
Hydrologic Soil Group	B
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	Well
Max Erosion Hazard	Low to Moderate
Erosion Factor (k)	0.25
Soil Productivity	Low to Moderate
Soil Manageability Group	II
Class	2ep
Annual Forage Production (lb/acre)	300 to 600
Forest Survey Site Class	NC

### Included Areas & Remarks

Included in this map unit are small areas of the Glean family, 5 to 15 percent slopes, on basalt flow terraces; the Mottsville family, in valleys; the Berent family, in valleys; & the Calpine family, 30 to 60 percent slopes, on adjacent mountainsides. Included areas make up approximately 30 percent of the map unit area.

## 176 - Calpine family - Rock outcrop complex, 0 to 15 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components	Calpine family	Rock outcrop, rhyolitic
Approx Proportion	50 percent	25 percent
Landscape Position	Terraces	Terraces
Slope	0 to 15 percent	—
Typical Vegetation	Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
	0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8	
Subsoil	15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5	—
Substratum	39 to 60 inches; pale brown very gravelly sandy loam; massive; hard; pH 6.5	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Moderate (5.1 inches)	—
Water Retention Class	2 (1.9 inches)	—
Hydrologic Soil Group	B	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Well	—
Max Erosion Hazard	Low	—
Erosion Factor (k)	0.25	—
Soil Productivity	Low to Moderate	—
Soil Manageability Group	II	—
Class	3Xp	—
Annual Forage Production (lb/acre)	300 to 600	—
Forest Survey Site Class	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of the Berent, Mottsville, Wrango, Brantel & Kiona families. Included areas make up approximately 25 percent of the map unit area.

## 177 - Torriorthentic Haploxerolls - Mottsville family association, 15 to 60 percent slopes

Elevation: 7,500 to 8,500 feet

Annual Precipitation: 10 to 17 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Torriorthentic Haploxerolls

50 percent

Mountainsides

30 to 60 percent

Pinyon Pine

### Mottsville family

15 percent

Mountain Toeslopes

15 to 30 percent

Pinyon Pine

### Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

0 to 19 inches; grayish brown gravelly sand loam & loamy coarse sand; weak granular structure; soft; pH 6.0 to 6.5

19 to 25 inches; grayish brown gravelly coarse sand; weak subangular blocky structure; soft; pH 6.8

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

25 to 60 inches; grayish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Low (3.2 inches)

Water Retention Class

2 (1.8 inches)

3 (1.2 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Low to Moderate

Erosion Factor (k)

0.22

0.25

Soil Productivity

Moderate

Low to Moderate

Soil Manageability

Group

III

III

Class

3Egpx

3Pe

Annual Forage Production (lb/acre)

400 to 800

200 to 500

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Railcity, Wrango, Corbett & Powment families, & Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

## 200 - Nanamkin family, 2 to 60 percent slopes

Elevation: 8,000 to 8,900 feet

Annual Precipitation: 15 to 20 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Nanamkin family

70 percent

Moraines & Moraine Basins

2 to 60 percent

Lodgepole Pine

### Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Subsoil

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Water Retention Class

3 (0.8 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.05

Soil Productivity

Low

Soil Manageability

Group

IV

Class

4EPgx

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

6-7

### Included Areas & Remarks

Included in this map unit are small areas of the Chesaw family, 10 to 35 percent slopes, in moraine basins, riparian corridors & lake fringes; the Stecum family, 30 to 60 percent slopes, on fringes of moraine sideslopes & on moraine sideslopes; the Glean family, 2 to 15 percent slopes, in moraine basins; & a soil similar to the Nanamkin family, but with a loamy-skeletal textural control section. Included areas make up approximately 30 percent of the map unit area.

## 201 - Rubbleland - Stecum family - Lithic Cryorthents association, 30 to 80 percent slopes

Elevation: 8,400 to 11,800 feet      Annual Precipitation: 15 to 30 inches

Soil Map Unit Components	<b>Rubbleland</b>	<b>Stecum family</b>	<b>Lithic Cryorthents</b>
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides	Lower Mountainsides, adjacent to Rubbleland	Upper Mountainsides, adjacent to Rock outcrop
Slope	—	30 to 80 percent	50 to 80 percent
Typical Vegetation	Barren	Whitebark Pine	Whitebark Pine

### Soil Profile Description

Surface Layer	Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	0 to 2 inches; pale brown extremely stony loamy sand; single grain; loose; pH 6.0.
Subsoil	—	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	—
Substratum	—	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	2 to 18 inches; pale brown very stony loamy & gravelly loamy sand; massive; soft; pH 6.4  18 inches; hard granitic bedrock

### Soil Properties

Restrictive Layer Depth	—	Greater than 60 inches	16 to 18 inches (HB)
Effective Rooting Depth (inches)	—	Very Deep (> 60 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Very Low (2.0 inches)	Very Low (0.7 inches)
Water Retention Class	—	3 (0.8 inches)	3 (0.7 inches)
Hydrologic Soil Group	—	A	B-C
Permeability (in./hr.)	—	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	—	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	—	Moderate to Very High	High To Very High
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability Group	—	IV	IV
Class	—	4EPXg	4GEPXd
Annual Forage Production (lb/acre)	—	< 300	200 to 400
Forest Survey Site Class	—	NC	NC

### Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on ridges & mountainsides; the Nanamkin family, at lower elevations; & a soil similar to Lithic Cryorthents, but with loamy- skeletal textures. Included areas make up approximately 25 percent of the map unit area.

## 203 - Chesaw family, 60 to 80 percent slopes

Elevation: 8,000 to 9,800 feet

Annual Precipitation: 15 to 25 inches

### Soil Map Unit Components

Approx Proportion

### Chesaw family

65 percent

Landscape Position

Mountainsides, in avalanche shoots

Slope

60 to 80 percent

Typical Vegetation

Quaking Aspen

### Soil Profile Description

Surface Layer

1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems

0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5

Subsoil

—

Substratum

13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.0 inches)

Water Retention Class

3 (1.0 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Very High

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

IV

Class

4GSEPx

Annual Forage Production (lb/acre)

300 to 600

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Biglake family, 30 to 60 percent slopes, on mountainsides; Rubbleland, on mountainsides; fractured Rock outcrop, on ridges & mountainsides; the Stecum & Nanamkin family. Included areas make up approximately 35 percent of the map unit area.

## 204 - Nanamkin - Corbett families association, 30 to 60 percent slopes

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Nanamkin family

60 percent

Moraine Sideslopes

30 to 60 percent

Mountain Mahogany & Lodgepole Pine

### Corbett family

20 percent

Smoother Moraine Sideslopes & Basins

30 to 50 percent

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5

52 inches; soft rhyolitic tuff

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

52 inches (FB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Low (2.4 inches)

Water Retention Class

3 (0.8 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.05

0.17

Soil Productivity

Low

Very Low

Soil Manageability

Group

IV

IV

Class

4EPgx

4EPg

Annual Forage Production (lb/acre)

200 to 400

< 200

Forest Survey Site Class

7-NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Chesaw family & Haypress families, in riparian corridors. Included areas make up approximately 20 percent of the map unit area.

## 205 - Rubbleland - Nanamkin - Glean families complex, 30 to 80 percent slopes

Elevation: 7,800 to 9,600 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components	Rubbleland	Nanamkin family	Glean family
Approx Proportion	40 percent	15 percent	15 percent
Landscape Position	Talus Slopes	Moraine Sideslopes, Ridges & Depressions	Moraine Sideslopes & Ridges
Slope	—	30 to 80 percent	30 to 60 percent
Typical Vegetation	Barren	Mixed Conifer-Fir	Mixed Conifer-Fir

### Soil Profile Description

Surface Layer	Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.	0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0	0 to 1 inch; dark grayish brown extremely stony loamy sand; single grain; loose; pH 6.4
Subsoil	—	—	1 to 15 inches; brown very stony & very cobbly sandy loam; weak granular structure; soft; pH 6.7
Substratum	—	7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0	15 to 60 inches; brown very cobbly sandy loam; massive; soft; pH 6.9

### Soil Properties

Restrictive Layer Depth	—	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	—	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	—	Very Low (2.3 inches)	Moderate (4.4 inches)
Water Retention Class	—	3 (0.8 inches)	2 (1.3 inches)
Hydrologic Soil Group	—	A	B
Permeability (in./hr.)	—	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	—	Somewhat Excessively	Well
Max Erosion Hazard	—	Moderate to Very High	Moderate to High
Erosion Factor (k)	—	0.05	0.05
Soil Productivity	—	Low	Moderate
Soil Manageability Group	—	IV	III
Class	—	4EPXg	3EXgp
Annual Forage Production (lb/acre)	—	200 to 400	400 to 800
Forest Survey Site Class	—	5-7	5-7

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Nanamkin family, but less than 20 inches to bedrock, 30 to 80 percent slopes, on moraine sideslopes; a soil similar to the Glean family, but with a high admixture of pumice, 30 to 60 percent slopes, on moraine sideslopes & ridges; the Chesaw family, 30 to 60 percent slopes, in moraine depressions; & a soil similar to the Glean family, but with ashy-skeletal material in the upper 20 inches of the soil, 60 to 80 percent slopes, on talus slopes. Included areas make up approximately 30 percent of the map unit area.

## 206 - Stecum - Charcol families - Rock outcrop association, 2 to 50 percent slopes

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	<b>Stecum family</b>	<b>Charcol family</b>	<b>Rock outcrop, mixed</b>
Approx Proportion	40 percent	20 percent	20 percent
Landscape Position	Moraine Sideslopes & Riparian Areas	Basins, Moraine Toeslopes & Riparian Areas	Exposed Ridges & Moraine Sideslopes
Slope	10 to 50 percent	2 to 15 percent	—
Typical Vegetation	Lodgepole Pine & Quaking Aspen	Western White Pine	Barren

### Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	1 to 0 inch; decomposing Big Sagebrush plant parts  0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Moderate (4.7 inches)	—
Water Retention Class	3 (0.8 inches)	2 (1.8 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Low to High	Low	—
Erosion Factor (k)	0.10	0.24	—
Soil Productivity	Low to Moderate	Moderate	—
Soil Manageability Group	IV	II	—
Class	4EPgx	2p	—
Annual Forage Production (lb/acre)	200 to 800	300 to 500	—
Forest Survey Site Class	6-7	6-7	—

### Included Areas & Remarks

Included in this map unit are small areas of Aquic Cryoborolls, 2 to 30 percent slopes, on margins of lakes; Lithic Cryorthents, 2 to 50 percent slopes, on moraine sideslopes, near rock outcroppings; & Rubbleland. Included areas make up approximately 20 percent of the map unit area.

## 213 - Stecum family - Rubbleland complex, 15 to 60 percent slopes

Elevation: 9,000 to 10,000 feet      Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	<b>Stecum family</b>	<b>Rubbleland</b>
Approx Proportion	50 percent	20 percent
Landscape Position	Lateral & Terminal Moraines	Lateral & Terminal Moraines
Slope	15 to 60 percent	—
Typical Vegetation	Lodgepole Pine & Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	—
Water Retention Class	3 (0.8 inches)	—
Hydrologic Soil Group	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Low to High	—
Erosion Factor (k)	0.10	—
Soil Productivity	Low	—
Soil Manageability Group	IV	—
Soil Manageability Class	4EPgx	—
Annual Forage Production (lb/acre)	< 300	—
Forest Survey Site Class	7-NC	—

### Included Areas & Remarks

Included in this map unit are small areas of the Charcol family, 15 to 30 percent slopes, in riparian areas; a soil similar to Vitrandic Xerochrepts, but colder, & underlain by mixed parent material, 0 to 15 percent slopes, on high mountain passes; Lithic Cryorthents, on moraines, adjacent to rock outcroppings; & Rock outcrop, on exposed moraine ridges. Included areas make up approximately 30 percent of the map unit area.

## 215 - Glean family, 0 to 50 percent slopes

Elevation: 7,600 to 8,900 feet

Annual Precipitation: 10 to 20 inches

### Soil Map Unit Components

Approx Proportion

### Glean family

80 percent

Landscape Position

Moraine Sideslopes & Crests

Slope

0 to 50 percent

Typical Vegetation

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 1 inch; dark grayish brown extremely stony loamy sand; single grain; loose; pH 6.4

Subsoil

1 to 15 inches; brown very stony & very cobbly sandy loam; weak granular structure; soft; pH 6.7

Substratum

15 to 60 inches; brown very cobbly sandy loam; massive; soft; pH 6.9

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.3 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.05

Soil Productivity

Moderate

Soil Manageability

Group

III

Class

3Egpx

Annual Forage Production (lb/acre)

400 to 800

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, around the base of the Sherwin Bowl; & a soil similar to the Nanamkin family, but with a loamy-skeletal surface texture, on rolling moraine ridges. Included areas make up approximately 20 percent of the map unit area.

## 216 - Railcity - Rock outcrop complex, 2 to 15 percent slopes

Elevation: 7,000 to 8,000 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components	Railcity family	Rock outcrop
Approx Proportion	70 percent	20 percent
Landscape Position	Moraine Basins	Lava Flows
Slope	2 to 15 percent	—
Typical Vegetation	Jeffrey Pine	Barren

### Soil Profile Description

Surface Layer	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
	0 to 14 inches; grayish brown & light grayish brown gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5	
Subsoil	—	—
Substratum	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0	—

### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (1.7 inches)	—
Water Retention Class	3 (0.5 inches)	—
Hydrologic Soil Group	A	—
Permeability (in./hr.)	Very Rapid (20+ in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Low	—
Erosion Factor (k)	0.05	—
Soil Productivity	Very Low	—
Soil Manageability Group	III	—
Class	4PX	—
Annual Forage Production (lb/acre)	< 200	—
Forest Survey Site Class	5-7	—

### Included Areas & Remarks

Included in this map unit are small areas of Nanamkin family, at higher elevations; & a soil similar to the Powment family, but shallow to hard basalt bedrock, near rock outcrops. Included areas make up approximately 10 percent of the map unit area.

## 217 - Nanamkin family - Rubbleland complex, 60 to 80 percent slopes

Elevation: 7,800 to 9,400 feet

Annual Precipitation: 15 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Nanamkin family

60 percent

Mountainsides

60 to 80 percent

Mixed Conifer - Fir

### Rubbleland

20 percent

Mountainsides

—

Barren

### Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

—

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.3 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

High to Very High

—

Erosion Factor (k)

0.05

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4GEPX

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

6-7

—

### Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on mountain ridges; a soil similar to the Glean family, but high in lime, & a soil similar to the Mascamp family, but high in lime. Included areas make up approximately 20 percent of the map unit area.

## 218 - Rock outcrop - Railcity family association, 30 to 90 percent slopes

Elevation: 7,800 to 9,400 feet

Annual Precipitation: 15 to 25 inches

### Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

### Rock outcrop

40 percent

Ridges & Bluffs

—

Barren

### Railcity family

35 percent

Mountainsides

30 to 90 percent

Mountain Mahogany

### Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves

0 to 14 inches; grayish brown & light brownish gray gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5

Subsoil

—

—

Substratum

—

14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

### Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth (inches)

—

Very Deep (> 60 inches)

Available Water Capacity

—

Very Low (1.7 inches)

Water Retention Class

—

3 (0.5 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Very Rapid (20+ in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to Very High

Erosion Factor (k)

—

0.05

Soil Productivity

—

Very Low

Soil Manageability

Group

—

IV

Class

—

4GEPX

Annual Forage Production (lb/acre)

—

< 200

Forest Survey Site Class

—

NC

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Powment family, but shallow to hard bedrock, on mountainsides, near rock outcroppings; a soil similar to the Chesaw family, but less than 40 inches to bedrock & effervescent throughout, on mountainsides, near calcareous rock outcroppings. Included areas make up approximately 25 percent of the map unit area.

### 301 - Neuske family, 15 to 30 percent slopes

Elevation: 6,400 to 9,400 feet

Annual Precipitation: 6 to 20 inches

Soil Map Unit Components	<b>Nueske family</b>
Approx Proportion	75 percent
Landscape Position	Mountainsides
Slope	15 to 30 percent
Typical Vegetation	Quaking Aspen

#### Soil Profile Description

Surface Layer	0 to 2 inches; brown gravelly fine sandy loam; weak granular structure; soft; pH 6.2
Subsoil	2 to 20 inches; brown gravelly loam & light yellowish brown clay loam; weak & moderate subangular blocky structure; soft, slightly hard; pH 6.5
Substratum	20 to 44 inches; light yellowish brown very cobbly loam; massive; slightly hard; pH 6.5  44 inches; soft weathered granitic and metasedimentary bedrock

#### Soil Properties

Restrictive Layer Depth	44 inches (PC)
Effective Rooting Depth (inches)	Deep (40 to 60 inches)
Available Water Capacity	Moderate (5.7 inches)
Water Retention Class	1 (3.2 inches)
Hydrologic Soil Group	B-C
Permeability (in./hr.)	Mod. Slow (0.2 to 0.6 in./hr.)
Drainage Class	Well
Max Erosion Hazard	Low to Moderate
Erosion Factor (k)	0.32
Soil Productivity	Moderate
Soil Manageability Group	II
Class	2e
Annual Forage Production (lb/acre)	400 to 800
Forest Survey Site Class	NC

#### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, Vitrandic Xeropsamments & the Fez family. Included areas make up approximately 25 percent of the map unit area.

## 302 - Rock outcrop - Abgese - Pass Canyon families complex, 15 to 30 percent slopes

Elevation: 8,200 to 8,900 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components	Rock outcrop, granitic	Abgese family	Pass Canyon family
Approx Proportion	40 percent	25 percent	20 percent
Landscape Position	Mountainsides & Ridges	Mountainsides	Mountainsides
Slope	—	15 to 30 percent	15 to 30 percent
Typical Vegetation	Barren	Pinyon Pine	Pinyon Pine

### Soil Profile Description

Surface Layer	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5	0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2
Subsoil	—	7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8	5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7
Substratum	—	10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6  26 inches; soft weathered granitic bedrock	13 inches; hard granitic bedrock

### Soil Properties

Restrictive Layer Depth	—	20 to 40 inches (FB)	13 to 19 inches (HB)
Effective Rooting Depth (inches)	—	Mod. Deep (20 to 40 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Low (2.3 inches)	Very Low (1.2 inches)
Water Retention Class	—	2 (1.7 inches)	3 (1.2 inches)
Hydrologic Soil Group	—	C	C-D
Permeability (in./hr.)	—	Mod. Slow (0.2 to 0.6 in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	—	Well	Well
Max Erosion Hazard	—	Low to Moderate	Low to Moderate
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability Group	—	III	IV
Class	—	3Xep	4PXed
Annual Forage Production (lb/acre)	—	300 to 600	< 300
Forest Survey Site Class	—	NC	NC

### Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

### 303 - Rock outcrop - Abgese - Pass Canyon families complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,900 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components	Rock outcrop, granitic	Abgese family	Pass Canyon family
Approx Proportion	40 percent	25 percent	20 percent
Landscape Position	Mountainsides & Ridges	Mountainsides	Mountainsides
Slope	—	30 to 60 percent	30 to 60 percent
Typical Vegetation	Barren	Pinyon Pine	Pinyon Pine

#### Soil Profile Description

	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5	0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2
Surface Layer			
Subsoil	—	7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8	5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7
Substratum	—	10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6	13 inches; hard granitic bedrock
		26 inches; soft weathered granitic bedrock	

#### Soil Properties

Restrictive Layer Depth	—	20 to 40 inches (FB)	13 to 19 inches (HB)
Effective Rooting Depth (inches)	—	Mod. Deep (20 to 40 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Low (2.3 inches)	Very Low (1.2 inches)
Water Retention Class	—	2 (1.7 inches)	3 (1.2 inches)
Hydrologic Soil Group	—	C	C-D
Permeability (in./hr.)	—	Mod. Slow (0.2 to 0.6 in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	—	Well	Well
Max Erosion Hazard	—	Moderate to High	Moderate to High
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability			
Group	—	IV	IV
Class	—	4EXgp	4EPXgd
Annual Forage Production (lb/acre)	—	300 to 600	< 300
Forest Survey Site Class	—	NC	NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

### 304 - Rock outcrop - Abgese - Pass Canyon families complex, 60 to 90 percent slopes

Elevation: 6,600 to 9,600 feet      Annual Precipitation: 5 to 25 inches

Soil Map Unit Components	<b>Rock outcrop, granitic</b>	<b>Abgese family</b>	<b>Pass Canyon family</b>
Approx Proportion	40 percent	25 percent	20 percent
Landscape Position	Mountainsides & Ridges	Mountainsides	Mountainsides
Slope	—	60 to 90 percent	60 to 90 percent
Typical Vegetation	Barren	Pinyon Pine	Pinyon Pine

#### Soil Profile Description

Soil Profile Component	Rock outcrop, granitic	Abgese family	Pass Canyon family
Surface Layer	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5	0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2
Subsoil	—	7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8	5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7
Substratum	—	10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6  26 inches; soft weathered granitic bedrock	13 inches; hard granitic bedrock

#### Soil Properties

Soil Property	Rock outcrop, granitic	Abgese family	Pass Canyon family
Restrictive Layer Depth	—	20 to 40 inches (FB)	13 to 19 inches (HB)
Effective Rooting Depth (inches)	—	Mod. Deep (20 to 40 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Low (2.3 inches)	Very Low (1.2 inches)
Water Retention Class	—	2 (1.7 inches)	3 (1.2 inches)
Hydrologic Soil Group	—	C	C-D
Permeability (in./hr.)	—	Mod. Slow (0.2 to 0.6 in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	—	Well	Well
Max Erosion Hazard	—	High to Very High	High to Very High
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability Group	—	IV	IV
Soil Manageability Class	—	4GEXp	4GEPXd
Annual Forage Production (lb/acre)	—	300 to 600	< 300
Forest Survey Site Class	—	NC	NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

### 305 - Delaney family - Rock outcrop complex, 0 to 30 percent slopes

Elevation: 7,000 to 8,300 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components	<b>Delaney family</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	50 percent	25 percent
Landscape Position	Sideslopes of Alluvial Fans	Tops & Sideslopes of Alluvial Fans
Slope	0 to 30 percent	—
Typical Vegetation	Pinyon Pine	Barren

#### Soil Profile Description

Surface Layer	0 to 10 inches; light brownish gray gravelly loamy sand; weak very fine granular structure; soft; pH 6.4	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—
Substratum	10 to 23 inches; brown loamy sand & gravelly loamy sand; massive; slightly hard; pH 6.4	—
	23 inches; hard rhyolitic bedrock	

#### Soil Properties

Restrictive Layer Depth	23 inches (HB)	—
Effective Rooting Depth (inches)	Mod. Deep (20 to 40 inches)	—
Available Water Capacity	Very Low (1.4 inches)	—
Water Retention Class	3 (1.2 inches)	—
Hydrologic Soil Group	B-C	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Low to Moderate	—
Erosion Factor (k)	0.15	—
Soil Productivity	Low	—
Soil Manageability Group	III	—
Class	4PXed	—
Annual Forage Production (lb/acre)	200 to 400	—
Forest Survey Site Class	NC	—

#### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Atter family, but dominated by pyroclastic rock fragments, 0 to 15 percent slopes, on fan tops, depressions & sideslopes; the Preston family, on fan sideslopes & the Atter family, 0 to 15 percent slopes, on fan tops & sideslopes. Included areas make up approximately 25 percent of the map unit area.

## 306 - Delaney family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 6,900 to 8,400 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components	<b>Delaney family</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	50 percent	25 percent
Landscape Position	Sideslopes of Alluvial Fans	Tops & Sideslopes of Alluvial Fans
Slope	30 to 60 percent	—
Typical Vegetation	Pinyon Pine	Barren

### Soil Profile Description

Surface Layer	0 to 10 inches; light brownish gray gravelly loamy sand; weak very fine granular structure; soft; pH 6.4	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—
Substratum	10 to 23 inches; brown loamy sand & gravelly loamy sand; massive; slightly hard; pH 6.4	—
	23 inches; hard rhyolitic bedrock	

### Soil Properties

Restrictive Layer Depth	23 inches (HB)	—
Effective Rooting Depth (inches)	Mod. Deep (20 to 40 inches)	—
Available Water Capacity	Very Low (1.4 inches)	—
Water Retention Class	3 (1.2 inches)	—
Hydrologic Soil Group	B-C	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	—
Erosion Factor (k)	0.15	—
Soil Productivity	Low	—
Soil Manageability Group	IV	—
Class	4EPXgd	—
Annual Forage Production (lb/acre)	200 to 400	—
Forest Survey Site Class	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Atter family, but dominated by pyroclastic rock fragments, on fan tops, depressions & sideslopes; the Preston family, on fan sideslopes & the Atter family, on fan tops & sideslopes. Included areas make up approximately 25 percent of the map unit area.

## 307 - Vitrandic Xeropsamments, warm, 15 to 30 percent slopes

Elevation: 7,000 to 8,300 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Vitrandic Xeropsamments, warm

75 percent

Hillsides

15 to 30 percent

Big Sagebrush & Bitterbrush

### Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand;  
massive; soft; pH 6.0

Subsoil

—

Substratum

1 to 60 inches; light brownish gray & light gray  
very gravelly & gravelly coarse sand; massive;  
soft; pH 6.5

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth  
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Water Retention Class

2 (1.3 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.20

Soil Productivity

Very Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production  
(lb/acre)

< 200

Forest Survey Site Class

5-6

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Haploxerolls, & Vitrandic Xerorthents, ashy, warm and Vitrandic Xerorthents, warm. Included areas make up approximately 25 percent of the map unit area.

## 308 - Vitrandic Xerorthents - Vitrandic Xerorthents, ashy complex 30 to 60 percent slopes

Elevation: 7,900 to 10,000 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Vitrandic Xerorthents

40 percent

Mountainsides

30 to 60 percent

Lodgepole & Jeffrey Pine

### Vitrandic Xerorthents, ashy

35 percent

Mountainsides

30 to 60 percent

Jeffrey & Lodgepole Pine

### Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles, twigs & small branches

1 to 0 inches; decomposing Jeffrey and Lodgepole Pine needles, twigs & small branches

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

0 to 4 inches; brown gravelly loamy sand; massive; soft; pH 6.0

Subsoil

—

4 to 23 inches; pale brown gravelly loamy sand & loamy sand massive; soft; pH 5.6 to 5.9

Substratum

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

23 to 60 inches; pale brown & pinkish gray very gravelly loamy sand & loamy sand; massive; soft; pH 5.1 to 5.9

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (0.8 inches)

Moderate (5.5 inches)

Water Retention Class

3 (0.3 inches)

2 (1.7 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.10

0.10

Soil Productivity

Very Low

Low

Soil Manageability

Group

III

III

Class

3Pgex

2gex

Annual Forage Production (lb/acre)

< 200

200 to 400

Forest Survey Site Class

5-7

5

### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, pumiceous, Vitrandic Haplo- xerolls, & Rock outcrop; & Vitrandic Torriorthents, ashy, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

### 309 - Vitrandic Xeropsamments, 15 to 30 percent slopes

Elevation: 7,000 to 8,500 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components  
 Approx Proportion  
 Landscape Position  
 Slope  
 Typical Vegetation

#### Vitrandic Xeropsamments

75 percent  
 Mountainsides  
 15 to 30 percent  
 Lodgepole & Jeffrey Pine

#### Soil Profile Description

Surface Layer

2 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles and twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

#### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.15

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

4-6

#### Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Haploxerolls, on mountainsides; Vitrandic Xerorthents, ashy; Vitrandic Xerorthents, cold; & Vitrandic Torriorthents, ashy, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

## 310 - Brantel family, 30 to 60 percent slopes

Elevation: 7,000 to 8,500 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

### Brantel family

Approx Proportion

75 percent

Landscape Position

Bench Terraces

Slope

30 to 60 percent

Typical Vegetation

Big Sagebrush & Bitterbrush

### Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 to 7.2

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Available Water Capacity

Low (2.4 inches)

Water Retention Class

3 (0.9 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.10

Soil Productivity

Low

Soil Manageability

Group

IV

Class

4EPg

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

NC

### Included Areas & Remarks

Included in this map unit are small areas of rock outcrop, on terraces; Vitrandic Xeropsamments, warm, at higher elevations, on bench terraces; Vitrandic Haplxerolls & Vitrandic Torriorthents, ashy, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

### 311 - Vitrandic Xeropsamments - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 8,300 to 9,900 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

#### Vitrandic Xeropsamments

50 percent

Mountainsides

15 to 30 percent

Lodgepole & Jeffrey Pine

#### Rock outcrop, rhyolitic

25 percent

Mountainsides & Ridges

—

Barren

#### Soil Profile Description

Surface Layer

2 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles and twigs

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

—

#### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (4.4 inches)

—

Water Retention Class

2 (1.4 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

III

—

Class

3Xep

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

5-7

—

#### Included Areas & Remarks

Included in this map unit are small areas of the Fez family, Vitrandic Xerorthents, Vitrandic Xerorthents, ashy & Vitrandic Xerorthents, pumiceous. Included areas make up approximately 25 percent of the map unit area.

## 312 - Wrango - Atter families complex, 30 to 60 percent slopes

Elevation: 5,900 to 10,200 feet

Annual Precipitation: 8 to 25 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Wrango family

50 percent

Mountainsides & Canyon Slopes

30 to 60 percent

Big Sagebrush & Rabbitbrush

### Atter family

35 percent

Mountainsides & Canyon Slopes

30 to 60 percent

Big Sagebrush

### Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy coarse sand, single grain; loose; pH 6.8

0 to 2 inches; brown extremely stony sandy loam; single grain; loose; pH 6.4

Subsoil

—

—

Substratum

15 to 60 inches; light brown very cobbly coarse sand; massive; slightly hard; pH 6.8

2 to 44 inches; pale red extremely stony loamy sand; strong subangular blocky structure; loose to hard; pH 6.5

44 inches; granitic glacial till

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

44 inches (PC)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Very Low (0.6 inches)

Water Retention Class

3 (1.1 inches)

3 (0.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

IV

IV

Class

4EPg

4EPgx

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

### Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, at higher elevations & the Sur family, on canyon slopes and mountainsides. Included areas make up approximately 15 percent of the map unit area.

### 313 - Wrango - Atter families complex, 60 to 90 percent slopes

Elevation: 6,000 to 10,200 feet

Annual Precipitation: 8 to 25 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

#### Wrango family

50 percent

Mountainsides & Canyon Slopes

60 to 90 percent

Big Sagebrush & Rabbitbrush

#### Atter family

35 percent

Mountainsides & Canyon Slopes

60 to 90 percent

Big Sagebrush & Pinyon Pine

#### Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy coarse sand, single grain; loose; pH 6.8

0 to 2 inches; brown extremely stony sandy loam; single grain; loose; pH 6.4

Subsoil

—

—

Substratum

15 to 60 inches; light brown very cobbly coarse sand; massive; slightly hard; pH 6.8

2 to 44 inches; pale red extremely stony loamy sand; strong subangular blocky structure; loose to hard; pH 6.5

44 inches; granitic glacial till

#### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

44 inches (PC)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Very Low (0.6 inches)

Water Retention Class

3 (1.1 inches)

3 (0.6 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

High to Very High

High to Very High

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

IV

IV

Class

4EGPx

4EGPX

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, at higher elevations & the Sur family, on canyon slopes and mountainsides, with rock outcrops on ridges. Included areas make up approximately 15 percent of the map unit area.

### 314 - Rock outcrop - Vitrandic Torriorthents, gravelly complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,000 feet

Annual Precipitation: 10 to 15 inches

#### Soil Map Unit Components

Approx Proportion

**Rock outcrop, rhyolitic**

**Vitrandic Torriorthents, gravelly**

Landscape Position

60 percent

25 percent

Slope

Steep Canyon Walls

Steep Canyon Walls

Typical Vegetation

—

30 to 60 percent

Barren

Big Sagebrush & Rabbitbrush

#### Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants

0 to 4 inches; pale brown very gravelly loamy sand; weak granular structure; soft; pH 6.4

Subsoil

—

—

Substratum

—

4 to 60 inches; pale brown & light gray cobbly, very cobbly & very gravelly loamy sand; massive; soft; pH 6.4

#### Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth (inches)

—

Very deep (> 60 inches)

Available Water Capacity

—

Moderate (4.1 inches)

Water Retention Class

—

2 (1.3 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to High

Erosion Factor (k)

—

0.15

Soil Productivity

—

Low to Moderate

Soil Manageability

Group

—

IV

Class

—

4EXgp

Annual Forage Production (lb/acre)

—

300 to 600

Forest Survey Site Class

—

NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Wrango families, on steep canyon walls. Included areas make up approximately 15 percent of the map unit area.

### 315 - Brantel family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 6,500 to 8,600 feet

Annual Precipitation: 5 to 20 inches

Soil Map Unit Components	<b>Brantel family</b>	<b>Rock outcrop, rhyolitic</b>
Approx Proportion	45 percent	40 percent
Landscape Position	Hillsides	Hillsides & Ridges
Slope	30 to 60 percent	—
Typical Vegetation	Big Sagebrush & Pinyon Pine	Barren

#### Soil Profile Description

Surface Layer	0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—
Substratum	9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 to 7.2	—

#### Soil Properties

Restrictive Layer Depth	Greater than 60 inches	—
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	—
Available Water Capacity	Low (2.4 inches)	—
Water Retention Class	3 (0.9 inches)	—
Hydrologic Soil Group	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	—
Erosion Factor (k)	0.10	—
Soil Productivity	Low	—
Soil Manageability		
Group	IV	—
Class	4EPXg	—
Annual Forage Production (lb/acre)	200 to 400	—
Forest Survey Site Class	NC	—

#### Included Areas & Remarks

Included in this map unit are small areas of the Berent & Yellowhills families, on hillsides. Included areas make up approximately 15 percent of the map unit area.

**316 - Delaney family - Rock outcrop - Vitrandic Torriorthents, ashy complex,  
0 to 30 percent slopes**

Elevation: 5,800 to 7,600 feet      Annual Precipitation: 6 to 12 inches

Soil Map Unit Components	<b>Delaney family</b>	<b>Rock outcrop, rhyolitic</b>	<b>Vitrandic Torriorthents, ashy</b>
Approx Proportion	50 percent	20 percent	15 percent
Landscape Position	Sideslopes of Alluvial Fans	Tops & Sideslopes of Alluvial Fans	Sideslopes of Alluvial Fans
Slope	0 to 30 percent	—	0 to 30 percent
Typical Vegetation	Big Sagebrush & Jeffrey Pine	Barren	Big Sagebrush & Jeffrey Pine

**Soil Profile Description**

Surface Layer	0 to 10 inches; light brownish gray gravelly loamy sand; weak very fine granular structure; soft; pH 6.4	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 12 inches; light gray & pale yellow sand; single grain & massive; loose & slightly hard; pH 8.0
Subsoil	—	—	—
Substratum	10 to 23 inches; brown loamy sand & gravelly loamy sand; massive; slightly hard; pH 6.4  23 inches; hard rhyolitic bedrock	—	12 to 60 inches; light gray & grayish brown stratified silt loam, fine sandy loam, sand, gravel sand & coarse sand; massive; slightly hard; pH 8.0 to 8.5

**Soil Properties**

Restrictive Layer Depth	23 inches (HB)	—	Greater than 60 inches
Effective Rooting Depth (inches)	Mod. Deep (20 to 40 inches)	—	Very Deep (> 60 inches)
Available Water Capacity	Very Low (1.4 inches)	—	Moderate (4.3 inches)
Water Retention Class	3 (1.2 inches)	—	2 (1.8 inches)
Hydrologic Soil Group	B-C	—	A-B
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—	Moderate (0.6 to 2 in./hr.)
Drainage Class	Somewhat Excessively	—	Somewhat Excessively
Max Erosion Hazard	Low to Moderate	—	Low to Moderate
Erosion Factor (k)	0.15	—	0.15
Soil Productivity	Low	—	Low
Soil Manageability			
Group	III	—	III
Class	4PXed	—	3Xep
Annual Forage Production (lb/acre)	200 to 400	—	200 to 400
Forest Survey Site Class	7-NC	—	6-NC

**Included Areas & Remarks**

Included in this map unit are small areas of a soil similar to the Fez family, but shallow to bedrock, adjacent to rock outcroppings; and a soil similar to the Brantel family, but shallow to a paralithic contact, on alluvial fans. Included areas make up approximately 15 percent of the map unit area.

### 317 - Vitrandic Torriorthents, gravelly - Brantel family complex, 2 to 30 percent slopes

Elevation: 7,000 to 9,300 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

#### Vitrandic Torriorthents, gravelly

40 percent

Hillsides

2 to 30 percent

Big Sagebrush & Rabbitbrush

#### Brantel family

35 percent

Dissected Alluvial Fans

2 to 30 percent

Big Sagebrush & Rabbitbrush

#### Soil Profile Description

Surface Layer

0 to 4 inches; pale brown very gravelly loamy sand; weak granular structure; soft; pH 6.4

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

4 to 60 inches; pale brown & light gray cobbly, very cobbly & very gravelly loamy sand; massive; soft; pH 6.4

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 7.2

#### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (4.1 inches)

Low (2.4 inches)

Water Retention Class

2 (1.3 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

III

Class

2ep

3Pe

Annual Forage Production (lb/acre)

300 to 600

200 to 400

Forest Survey Site Class

NC

NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Delaney, Lakash, Berent & Wrango families. Included areas make up approximately 25 percent of the map unit area.

## 318 - Fez family, 2 to 15 percent slopes

Elevation: 8,400 to 8,600 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components  
Approx Proportion  
Landscape Position  
Slope  
Typical Vegetation

### Fez family

75 percent

Drainages and Depressions

2 to 15 percent

Aspen and Lodgepole Pine

### Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Aspen leaves & twigs

0 to 10 inches; grayish brown & brown sand;  
massive; soft; pH 6.0

Subsoil

—

Substratum

10 to 60 inches; brown & light yellowish brown  
sand; massive; soft; pH 6.0

### Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth  
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Water Retention Class

2 (1.9 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.14

Soil Productivity

Low to Moderate

Soil Manageability  
Group

II

Class

2p

Annual Forage Production  
(lb/acre)

400 to 800

Forest Survey Site Class

5-7

### Included Areas & Remarks

Included in this map unit are small areas of the Haypress family, on gentle mountainsides; Vitrandic Xerorthents, ashy, and Vitrandic Xerorthents, pumiceous, on the fringe of depressions. Included areas make up approximately 25 percent of the map unit area.

### 319 - Waterman - Sur families - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 5,800 to 7,000 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components	<b>Waterman family</b>	<b>Sur family</b>	<b>Rock outcrop, granitic</b>
Approx Proportion	30 percent	30 percent	15 percent
Landscape Position	Hillsides	Hillsides	Hillsides & Ridges
Slope	15 to 30 percent	15 to 30 percent	—
Typical Vegetation	Pinyon Pine & Big Sagebrush	Pinyon Pine & Big Sagebrush	Barren

#### Soil Profile Description

Surface Layer	0 to 3 inches; brown extremely bouldery loamy sand; weak granular structure; soft; pH 6.6	0 to 12 inches; brown gravelly loamy sand & very cobbly sandy loam; weak & moderate subangular blocky structure; soft; pH 6.7	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 12 inches; pale brown extremely bouldery loamy sand & sand; moderate subangular blocky & massive structure; slightly hard; pH 6.6	12 to 60 inches; pale brown very cobbly & very gravelly sandy loam; massive; very hard; pH 6.7	—
	12 inches; hard adamellite bedrock		

#### Soil Properties

Restrictive Layer Depth	7 to 20 inches (HB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (0.2 inches)	Low (3.3 inches)	—
Water Retention Class	3 (0.2 inches)	2 (1.3 inches)	—
Hydrologic Soil Group	C-D	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Low to Moderate	Low to Moderate	—
Erosion Factor (k)	0.05	0.10	—
Soil Productivity	Very Low	Low to Moderate	—
Soil Manageability			
Group	IV	II	—
Class	4PXe	2epx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

#### Included Areas & Remarks

Included in this map unit are small areas of the Wrango & Delaney families, and Torriorthentic Haploxerolls, on hillsides. Included areas make up approximately 25 percent of the map unit area.

## 320 - Waterman - Sur families - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 4,400 to 8,600 feet

Annual Precipitation: 4 to 17 inches

Soil Map Unit Components	Waterman family	Sur family	Rock outcrop, granitic
Approx Proportion	30 percent	30 percent	15 percent
Landscape Position	Hillsides & Moraines	Hillsides & Moraines	Hillsides, Ridges & Moraines
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Pinyon Pine & Big Sagebrush	Pinyon Pine & Big Sagebrush	Barren

### Soil Profile Description

Surface Layer	0 to 3 inches; brown extremely bouldery loamy sand; weak granular structure; soft; pH 6.6	0 to 12 inches; brown gravelly loamy sand & very cobbly sandy loam; weak & moderate subangular blocky structure; soft; pH 6.7	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 12 inches; pale brown extremely bouldery loamy sand & sand; moderate subangular blocky & massive structure; slightly hard; pH 6.6	12 to 60 inches; pale brown very cobbly & very gravelly sandy loam; massive; very hard; pH 6.7	—
	12 inches; hard adamellite bedrock		

### Soil Properties

Restrictive Layer Depth	7 to 20 inches (HB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (0.2 inches)	Low (3.3 inches)	—
Water Retention Class	3 (0.2 inches)	2 (1.3 inches)	—
Hydrologic Soil Group	C-D	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.05	0.10	—
Soil Productivity	Very Low	Low to Moderate	—
Soil Manageability			
Group	IV	III	—
Class	4EPXg	3Egpx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

### Included Areas & Remarks

Included in this map unit are small areas of the Wrango, Atter families & Torriorthentic Haploxerolls, on hillsides. Included areas make up approximately 25 percent of the map unit area.

### 321 - Yellowhills family, 2 to 15 percent slopes

Elevation: 6,000 to 8,400 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components	<b>Yellowhills family</b>
Approx Proportion	80 percent
Landscape Position	Alluvial Fans & Depressions
Slope	2 to 15 percent
Typical Vegetation	Big Sagebrush

#### Soil Profile Description

Surface Layer	0 to 5 inches; grayish brown gravelly coarse sand & sand; single grain & massive; loose & soft; pH 6.0
Subsoil	—
Substratum	5 to 60 inches; brown & yellowish brown loamy sand; massive; soft; pH 6.5 to 7.0

#### Soil Properties

Restrictive Layer Depth	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)
Available Water Capacity	Moderate (5.1 inches)
Water Retention Class	2 (1.6 inches)
Hydrologic Soil Group	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively
Max Erosion Hazard	Low
Erosion Factor (k)	0.10
Soil Productivity	Low to Moderate
Soil Manageability Group Class	II 2p
Annual Forage Production (lb/acre)	300 to 600
Forest Survey Site Class	NC

#### Included Areas & Remarks

Included in this map unit are small areas of the Delaney, Brantel & Lakash families. Included areas make up approximately 20 percent of the map unit area.